



# AUSTRALIAN communications

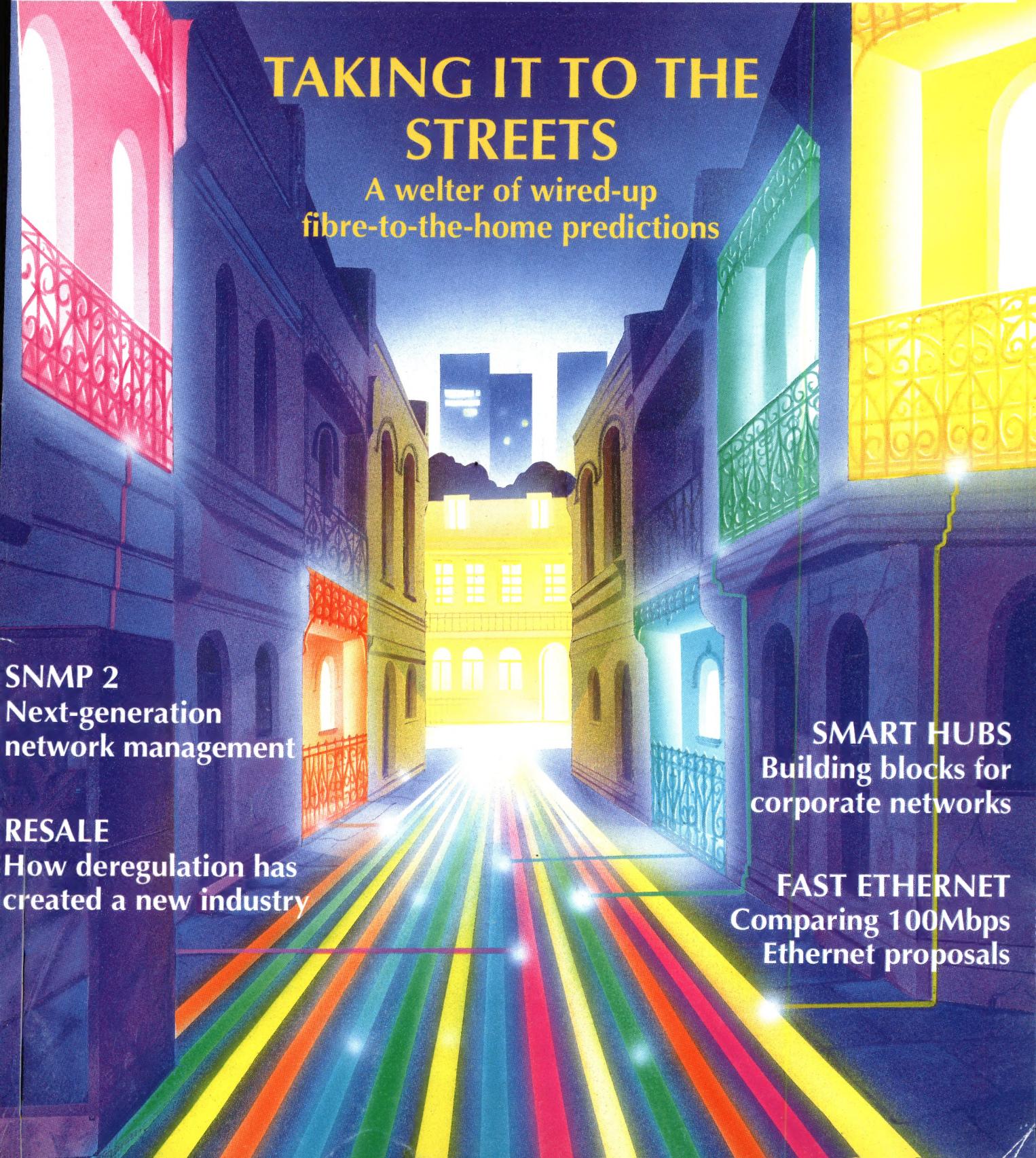
MARCH 1993

The Data and Telecommunications Management Magazine

\$5.50

## TAKING IT TO THE STREETS

A welter of wired-up  
fibre-to-the-home predictions



**SNMP 2**  
Next-generation  
network management

**RESALE**  
How deregulation has  
created a new industry

**SMART HUBS**  
Building blocks for  
corporate networks

**FAST ETHERNET**  
Comparing 100Mbps  
Ethernet proposals

# Now you can Bridge the Gap



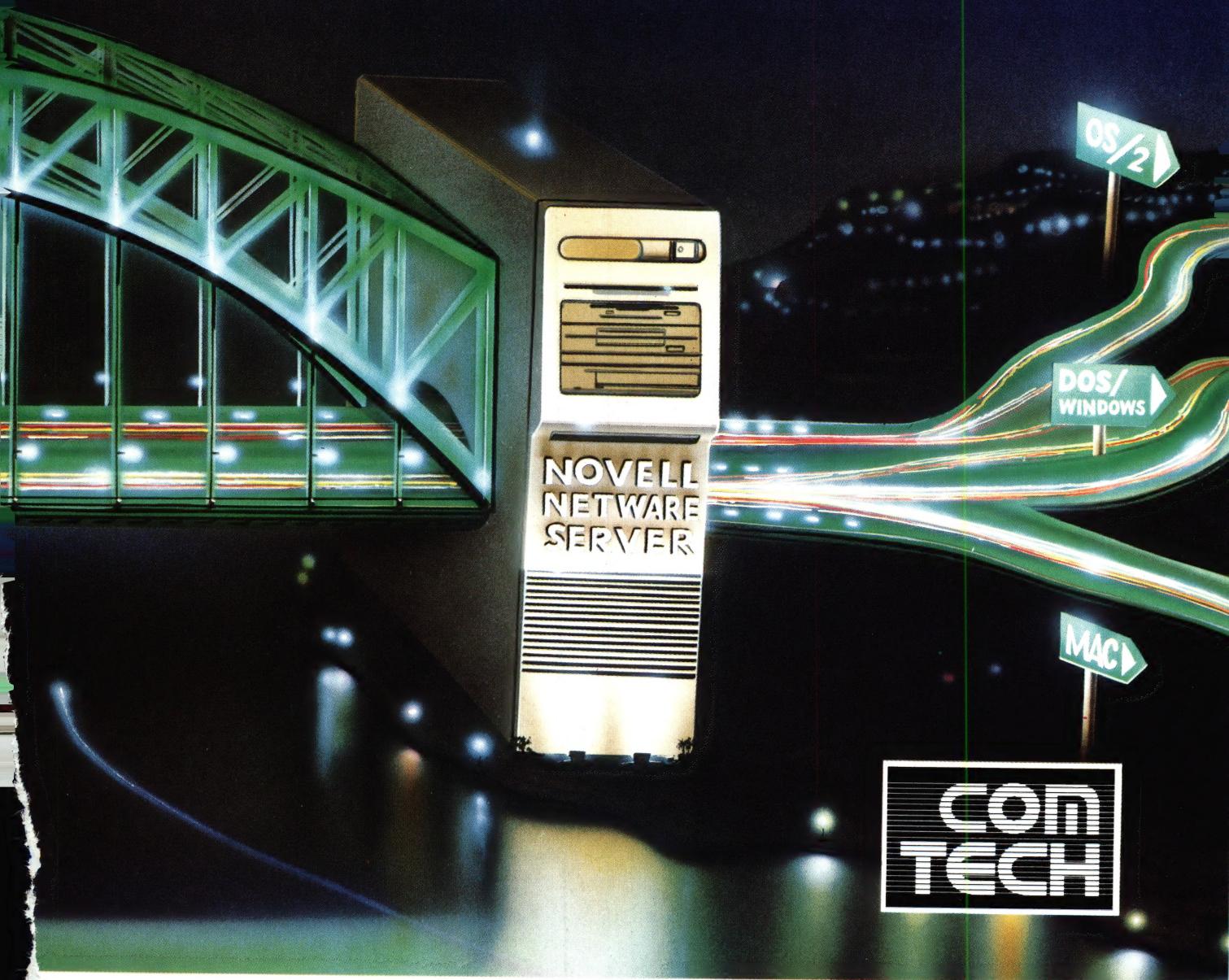
**N**ow with Novell's NetWare NFS and LAN WorkPlace products, you can integrate your computer operating systems to create a single system that works more efficiently.

Novell's NetWare NFS software transparently integrates Unix systems with the NetWare v3.11 environment enabling the NetWare server to provide Network File System file services and Line Printer Daemon print services to Unix NFS clients. LAN WorkPlace for DOS provides DOS and

Microsoft Windows users with concurrent access to Unix systems and other Novell network resources using the TCP/IP protocol suite. Its ease of use, low memory consumption, high performance and reliability make LAN WorkPlace the ideal choice. And there are versions of LAN WorkPlace for OS/2 and Macintosh. NetWare NFS and LAN WorkPlace are backed by the extensive resources of Com Tech - Australia's leading Open Systems distributor. Com Tech's

depth of expertise in network installations is evidenced by the fact that over 50% of our staff are dedicated to technical service and support. And there are dedicated specialist Novell and Unix technical support teams available to facilitate the smooth integration of your computer system. So if your organisation is running independent operating systems, bridge the gap with NetWare NFS and LAN WorkPlace.

# between your Operating Systems.



**NetWare® NFS**  
**LAN WorkPlace®**  
for DOS, OS/2 and Macintosh

**NOVELL**

For details of your nearest authorised reseller please phone Com Tech on :  
NSW (02) 317 3088 or (008) 263 954, VIC (03) 696 0770, ACT (06) 257 7695, QLD (07) 369 8800,  
SA (08) 233 5882, WA (09) 322 5605.

All products referred to by their trade names are protected under the provision of relevant trade marks and patent legislation and accordingly none of the products or the names may be copied in any way without the prior consent of the proprietor. All registered or unregistered trade marks referred to are the property of their respective owners.  
CT 2821/LAN Smith Ross & Muir

Please rush me more information on Novell NetWare NFS and LAN WorkPlace products.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Post Code \_\_\_\_\_

Send to: Com Tech Communications, PO Box 207,  
Alexandria NSW 2015 or Fax to (02) 317 3339.

# AUSTRALIAN communications

Cover: Tony Pyrzakowski



## FIBRE-TO-THE-HOME 61

Futurologists may predict that 21st Century homes will need 200 channels of cable-delivered television, interactive educational and information services, home shopping and banking, centralised security systems, home-printed electronic newspapers, and a host of other services — but do we really want or need them? Is a fibre-wired suburbia nothing more than the technophile's dream of paradise? Telecom currently predicts that by 1994, optical fibre will be within 700 metres of 60% of homes in all capital cities except Hobart and Darwin, but pushing it further will require massive expenditure and a massive effort. Stewart Fist examines what's involved and some proposed fibre-to-the-home schemes.

## SNMP II 71

Today, roughly 25% of all network management systems worldwide use SNMP, and SNMP vendors are growing at up to 75% annually. Even more impressive, the number of network devices that can be overseen by SNMP has increased by two orders of magnitude in the past two years or so. But, wildly successful as it is, the simple network management protocol could stand some improving, particularly with regard to network security features. Enter SNMP 2, the first revision of the hugely popular multivendor management protocol. Slated for release early this year, the upgrade is the handiwork of Internet Engineering Task Force (IETF) members Jeffrey Case, Keith McCloghrie, Marshall Rose, and Steven Waldbusser.

## SMART HUBS 81

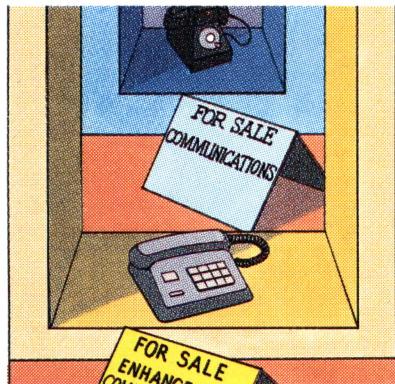
Smart hubs stand the best chance of evolving into the primary platform for corporate networks. But do the current offerings have what it takes to support enterprise networks? To help find out, the US-based Data Comm Test Lab has performed the industry's first hands-on evaluation of smart hubs as building blocks for the enterprise. In an attempt to separate hard facts from hearsay, the Data Comm Lab checked out five high end hubs from market-leading vendors Cabletron Systems, Chipcom, Lannet Data Communications, SynOptics Communications, and Unger-mann-Bass. The verdict? Network managers choosing to work with any of the products evaluated won't go wrong.

Australian Communications has moved. Our new address is

**AUSTRALIAN  
communications**



**Level 4  
541 Kent Street  
Sydney  
NSW 2000  
Tel: (02) 264 2200  
Fax: (02) 264 2244**



## RESALE

89

Behold the great Australian Resale Revolution! The landmark reforms in telecommunications regulation in the last few years have spurred the development of resale in Australia. Mark McDonnell examines the burgeoning industry and its leading players and finds that telecoms users now enjoy an unprecedented choice in service offerings for long distance and international carriage of their voice, data and facsimile traffic. Underlying the variety of reseller offerings is a fundamental difference in approach: While some resellers have made large investments in switching systems and support facilities, others have spent little or nothing on a separate infrastructure.

## ANALYSIS

- 15 The Great Videotex Flop
- 18 Clear, TCNZ Still in the Dock
- 18 Standard, Proprietary of Delux?
- 20 Can Mobiles Give You Cancer?
- 20 States Woo Arena GSM
- 22 A New Deal For Telecom's Union
- 24 AT&T Sues MCI Over Patents
- 25 TCNZ Restructures



## INTERVIEW

### 51 Warwick Smith

Appointed as Shadow Minister for Communications in February, 1991, former Launceston lawyer Warwick Smith has managed well in Opposition — but what about government? Liz Fell asked him about his agenda if the Coalition wins power.



## LEGAL LINE

### 49 Clearly Complicated in NZ

The deregulation of telecommunications in New Zealand has proved to be a boon for lawyers. Peter Leonard examines the recent inter-carrier interconnection and access arrangements decision handed down by the New Zealand High Court.



## MANAGEMENT

### 97 Benchmarking Measurements

In his concluding article on benchmarking, Brian White examines the types of activities that can be measured in a benchmarking exercise and the meaning of the measured results. He concludes that benchmarking is the key to improved performance.

## Gaps in Benchmark Param

| Parameter or Ratio | Example Causes for  |
|--------------------|---|
| \$/telephone       | Network design<br>The mix of carrier set<br>PABX software config  |
| Asset Value        | Recent upgrade<br>Under capitalisation<br>Leasing, renting, solid |

## OPINION

- 58 Tom Amos looks at the regulation of cellular mobile communications.

- 59 Alex Gosman examines the industry policy challenges in the near future.

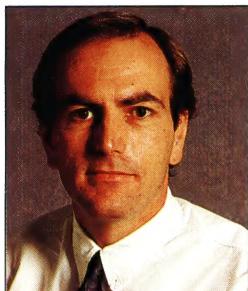
## TECHNOLOGY

- 27 Ethernet Gears Up to 100Mbps
- 28 Market Watch
- 29 Extending SNMP to the Desktop
- 33 MCN — Arena's Marketing Ruse?
- 34 Channel 7 Broadcasts Fax
- 36 Research Notes — Melfyn Lloyd
- 38 Technology Update
- 40 The Compaq Connection
- 42 Auscript Downsizes With Vines
- 43 LAN Views — Graeme Le Roux
- 44 Internetworking — Robyn Layland
- 46 OSI Tutorial — Alan Lloyd

## DEPARTMENTS

|                 |     |                |     |
|-----------------|-----|----------------|-----|
| VIEWPOINT       | 6   | THE PTC VIEW   | 115 |
| UPDATE          | 10  | THE ATUG PAGES | 117 |
| PRODUCT FILE    | 101 | CALENDAR       | 122 |
| THE AUSTEL VIEW | 113 |                |     |

## A Phony Choice?



The privatisation of AOTC seemingly loomed as the most fundamental telecommunications policy difference between the Government and the Coalition as this edition went to press. But how real is the difference?

In his interview with Liz Fell commencing on page 51, the Shadow Communications Minister, Warwick Smith, flagged AOTC's privatisation as his highest priority if the Coalition gains power in the upcoming Federal Election. Citing

political philosophy ("... there is no reason why a Government needs to be in the business of business"), capitalisation requirements and the performance benefits likely to flow from the imposition of market discipline, Mr Smith outlines to Liz why he believes privatisation is necessary and how the Coalition plans to go about it. It all makes for a persuasive case and one that has been accepted elsewhere in the world, he says. After prompting, he also contends that the Coalition plans to use the money to be raised for the reduction of Commonwealth debt — despite the general consensus among most political commentators that the acceleration of the sale as outlined in the revised *Fightback!* plan is to help fill a large funding hole created by GST exemptions.

As we all know too well, the Government also has its funding problems and as the partial sales of Qantas and the Commonwealth Bank demonstrate, it hasn't let its philosophical inheritance get in the way of financial expediency in the past. What makes AOTC special? In fact, on the evidence so far, it would appear that the opposite is the case. Over the past few years the Government has taken great steps to liberalise telecommunications and promote competition. All of these steps have been at the expense of AOTC and notions of the virtues of public monopoly service provision. Privatisation is simply the next step and with tax cuts and new spending promises to fund, it's hard to see how it would not, at some time, be taken.

Are there any other policy differences? Not really. Mr Smith also promises to give Austel a shake and speed up mobile competition but they are hardly great issues. He also questions the two-carrier duopoly industry structure until 1997, but it's very, very difficult to see how he could go about changing that. So the reality is that there's probably not much to choose from between the two sides, which either demonstrates the appropriateness of the Government's policies so far or a lack of policy development by the Coalition.

Australian Communications has moved. Our new address is

**AUSTRALIAN  
communications**

# AUSTRALIAN communications

**EDITOR**  
Mark Smeaton

**CONTRIBUTORS**

Tom Amos, Stewart Fist, Liz Fell,  
Peter Leonard, Peter Waters,  
Stuart Corner, Graeme Le Roux,  
Brian White, Bernard Levy,  
Darren Edwards

**JOURNALIST**  
Linda Peatling

**PRODUCTION MANAGER**  
Samantha Keats

**ILLUSTRATIONS**  
Samantha Keats,  
Tony Pyrzakowski, Louis Silvestro

**NATIONAL SALES MANAGER**  
Craig Burkhill

**Subscriptions**

*Australian Communications* is available by paid subscription for \$54 per annum. Subscribers receive eleven issues per annum.

| 1 Year Overseas Rates                                      |  | Surface | Air   |
|--|--|---------|-------|
| New Zealand, Papua New Guinea                              |  | \$65    | \$92  |
| Singapore, Indonesia, Malaysia,<br>Brunei, Pacific Islands |  | \$65    | \$105 |
| Asia — including Hong Kong, India,<br>Korea, Japan, Taiwan |  | \$65    | \$115 |
| Europe, North America, Middle East,<br>South America       |  | \$80    | \$140 |

**Publishers**

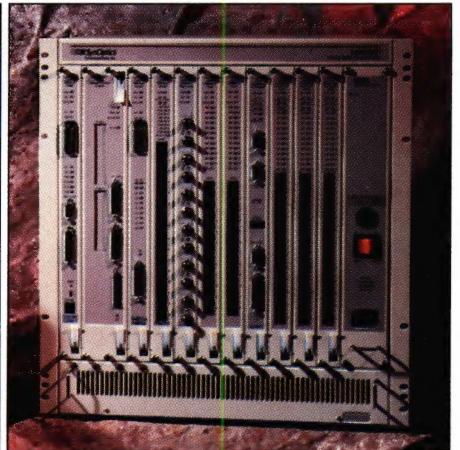
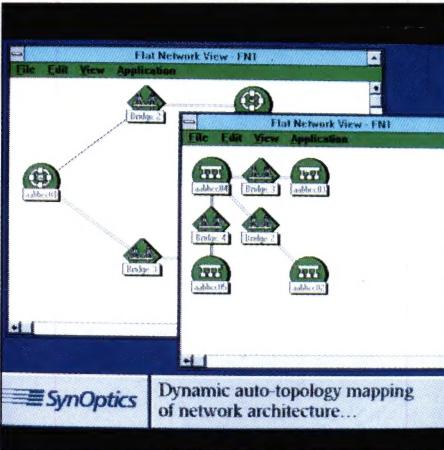
Published and distributed monthly by Ostasun Pty Ltd (ACN 003 606 102) under licence from Computer Publications Pty. Ltd. of 54 Park Street, Sydney NSW 2000. ISSN 0818-9021. **Address:** Level 4, 541 Kent Street, Sydney NSW 2000. **Tel:** (02) 264 2200 **Fax:** (02) 264 2244.

Printed at Offset Alpine Printing, Derby & Wetherill Streets, Silverwater NSW 2141

All material contained within *Australian Communications* is protected under the *Commonwealth Copyright Act 1968*. No material may be reproduced in part or whole without written consent from the copyright holders. Articles reprinted in this issue from *Data Communications* (USA) are copyright 1993 by McGraw-Hill Inc. All rights reserved. Published from *Data Communications* with the permission of McGraw-Hill Inc., 1221 Avenue of the Americas, New York, New York. Reproduction in any manner, in any language, in whole or in part without the prior written permission of McGraw Hill Inc. is expressly prohibited. The opinions expressed in this magazine are not necessarily those of the publisher. We welcome feature articles from contributors. Manuscripts should be typewritten and all text, photographs and illustrations must be accompanied by a stamped, self-addressed envelope stamped to the appropriate value. Retain duplicates of both text and illustrative material; Ostasun (Pty. Ltd.) does not accept responsibility for damage to, or loss of material submitted for publication.

**Level 4**  
**541 Kent Street**  
**Sydney**  
**NSW 2000**  
**Tel: (02) 264 2200**  
**Fax: (02) 264 2244**

# LET'S TALK NETWORKING



## Manage system changes with SynOptics™ and Anixter.

SynOptics Lattisnet® is the hub of client-server computing for the world's most reliable networks. SynOptics offers both modular hubs, like the 3000 Series concentrator, and workgroup hubs, like the 2800 Series Ethernet and 2700 Series Token Ring concentrators.

Establishing these intelligent hubs as your network control point helps you manage the evolution of your Ethernet, Token Ring and FDDI LANs by providing a

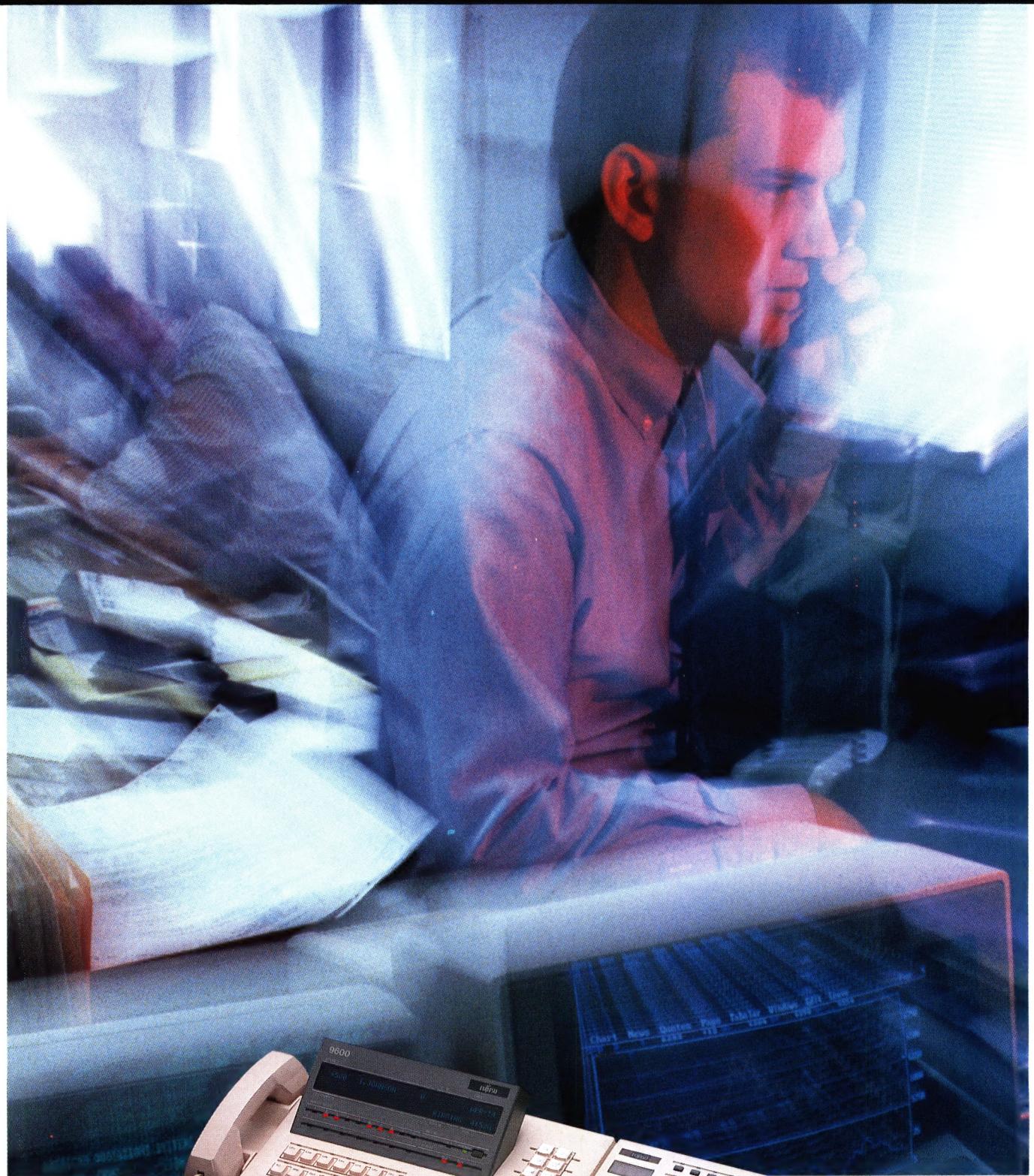
graphical window into your entire enterprise—from global perspectives to views of individual host ports.

*Anixter has the experience. Over \$100 million of SynOptics sales in 1992 prove this beyond a doubt!*

As the world's premier wiring systems and networking specialist—and SynOptics' largest distributor—Anixter's new distribution center in Sydney is ready to help you with the networking solutions best suited to meet your needs. Call us today!

**ANIXTER**  
Global Wiring Systems Specialists  
Data • Voice • Video • Energy

WHY DOES THIS PABX



# STAND ABOVE THE REST?

**Because of the company that stands behind it.**

**T**hat company is Fujitsu. We're a total communications solutions supplier. We're in the business of solving problems, not just selling products. We make almost every kind of communications hardware and software there is, and we can bring it all together in ways that will surprise you.

When you come to us for a PABX—or any other kind of communications equipment or system—we stand back and take a look at your whole situation. And then we marshal our resources to give you a total solution.

If all you want is a PABX that's ISDN compatible, that offers the highest quality in the world, a huge range of applications (including ACD/MIS), an easily expandable

and upgradeable modular architecture, and service you won't believe, we'll give you that. But we could give you much more, too. We could give you new ideas—and all the hardware, software, training, service and support you need to make those ideas real.



Fujitsu is the world's 2nd largest computer maker and a global leader in telecommunications, with operations in over 100 countries and annual sales of A\$33 billion. We have been in the Australian PABX market for more than four years, supplying it with systems designed and manufactured right here—and exported from here to nations around the world. That's just one more reason why when you think "PABX" you should think "Fujitsu".

---

**FUJITSU**

COMPUTERS, COMMUNICATIONS, MICROELECTRONICS

For information contact: Fujitsu Australia Limited. NSW: 475 Victoria Ave, Chatswood 2067 Tel: (02)410 4555, FAX: (02)411 8603.

VICTORIA: 607 St Kilda Road, Melbourne 3004 Tel: (03)520 8445, FAX (03)520 8800. Toll Free: 13 23 22

## Optus Wins Coverage Reprieve; Posts Loss

Austel last month gave Optus Communications a three month reprieve to meet its licence obligation to provide coverage to 45% of Australia's population. Required by its carrier licence to achieve this level of coverage by the end of last year, Optus now has until March 15 to satisfy its obligations. A failure to do so could lead to a \$10 million fine.

Austel has reportedly granted the extension on the basis of Optus' claim that it interpreted its obligation to mean 45% of lines which had calling line identification (CLI). There were also rumblings that Telecom's lack of co-operation had caused the shortfall — a claim that was

quickly denied by AOTC CEO, Frank Blount, who reportedly wrote to Optus CEO, Bob Mansfield, pointing out that in his opinion, Telecom had exceeded its obligations to Optus. Bob Mansfield reportedly later agreed that Telecom was not at fault.

As at the end of last year, Optus had managed to introduce its long distance services to the Melbourne, Canberra and Sydney regions, accounting for less than 40% of the population. By March 15, the carrier has guaranteed that full services will be extended to Newcastle, Geelong, Wollongong, Gosford, Penrith and the Mornington Peninsula in Victoria.

Covering the period from 6 November 1991 until 30 June 1992, Optus' first annual return reveals a loss of \$5.59 million and cash receipts from operations of \$66.52 million. Total assets were valued at \$1.24 billion and issued and paid up share capital was \$845 million. Total liabilities were \$402.8 million, including \$300 million (out of a purchase price of \$800 million) to be paid in four equal six monthly payments commencing 10 January 1995 to the Government for Aussat and its licences. As of 30 June 1992, Optus valued its licences at \$683.40 million and its property, plant and equipment at \$302.78 million.

## Alcatel Signs PDP Agreement

Alcatel Australia has agreed to undertake over \$1 billion worth of export and research and development activity following its joining of the Federal Government's Partnership for Development Program (PDP).

The agreement was signed in Melbourne last month by Technology, Industry and Commerce Minister, Senator John Button, Chairman and Managing Director of Alcatel Australia, Bill Page-Hanify and Francois Petit on behalf of Alcatel's parent, Alcatel NV.

It centres around Alcatel's plans for annual exports worth \$250 million between now and 1997 and annual R&D expenditure of \$30 million. The bulk of

the export earnings will flow from the operations of Port Botany-based submarine fibre optic cable maker, Alcatel TCC, which expects annual exports to average \$150 million during the period. The rest will flow mainly from exports of telephones, System 12 exchanges, GSM digital cellular mobile phone equipment and metropolitan area network technology manufactured under licence from QPSX Communications.

Alcatel joins Nokia Telecommunications as a recent telecommunications industry PDP signatory. Nokia promises \$120 million in exports and \$25 million in local R&D over the next seven years.



Senator John Button (right) with Alcatel Australia's Chairman and CEO, Bill Page-Hanify, and Alcatel NV's Francois Petit (left)

## Jtec to Deliver Telecom Pay TV?

Pay TV over copper cable may eventuate in Australia if Telecom can be satisfied that AT&T-developed asymmetrical digital subscriber line (ADSL) technology is all that it's cracked up to be. And local manufacturer Jtec may be the big winner in supplying the necessary infrastructure.

Telecom announced in late January that it is seeking expressions of interest for the design and supply of an ADSL network for the eventual delivery of Pay TV. Shortly after, world-leading Australian ISDN specialist Jtec announced that it had reached agreement with AT&T Paradyne to incorporate its technology in an ADSL product.

## SITA Opens Sydney Hub

Senator John Button last month opened SITA's new telecommunications centre in the Sydney CBD. Housing a DCP-50 data switch, the 350m<sup>2</sup> facility will serve as the international airline co-operative's regional hub and the centre of its Australian activities. With traffic running at 10 million messages per week and growing by 30% p.a., SITA serves around 500 members.

## Carriers Offer New Backup Deal

OTC has joined with eight Asia-Pacific international carriers to provide automatic restoration and money-back service guarantees following the launch in late January of a new network management service.

In essence, the new service entails the automatic switching of customer traffic to an ISDN backup line by an automatic restoration unit (ARU) upon the detection of a problem. OTC says this will be provided at between 10 to 15% of the cost of leasing an extra private line for backup. In addition, the service guarantees include automatic fault reporting and single-end billing and ordering.

Joining with OTC in offering the service from the second quarter of this year will be AT&T, Telecom New Zealand International, Singapore Telecom and Japan's KDD. Korea Telecom, the Philippine Long Distance Telephone Company (PLDT), Telecom Malaysia and Taiwan's ITA will join later this year and in 1994. The new service will initially support both 64Kbps and 56Kbps applications.

## Optus Leases Sydney Fibre

Optus has signed a 25 year agreement to lease fibre optic cable capacity and underground ducts in the Sydney CBD from Sydney Electricity.

According to Alan Oldfield, Optus' Director, National Network, the new deal "is a classic win-win situation." The Sydney power utility "gains by leasing surplus network capacity, and Optus can now incorporate that excess cable as part of Optus' own fibre network which surrounds Sydney and connects with Optus' major national and international exchange at Rosebery," he said.

Sydney Electricity's \$17 million project to install fibre optic links to 350 Sydney CBD substations is progressing, with 35 kilometres of a planned 120 kilometres of cable so far in place.



Ericsson Australia Vice President Kevin Casey (left) with Vodafone Group Director Chris Gent

## Ericsson Lands \$200m Arena Order

Ericsson Australia has become the first major beneficiary of new mobile carrier Arena GSM's promise to spend \$400 million on infrastructure by winning a \$200 million equipment order. Announced in early February, the purchase will make Ericsson Arena's key equipment supplier until the end of 1996.

Under the contract, Arena will purchase around \$60 million worth of Ericsson equipment this year in order to meet its September network roll out goal. Ericsson will supply the new carrier with switches, base stations and base station controllers from its Broadmeadows facility in Victoria.

Chris Gent, a Group Director with Arena's UK parent company Vodafone Group Plc, said that he was "delighted" with the agreement which will help provide a boost for the local manufacturing sector.

"The equipment will be predominantly made in Australia and will create considerable local employment, fulfilling industrial policy commitments made to the Australian Government at the time the licence was granted," he said.

Arena plans to commence its services in Sydney, Melbourne and Canberra this year and to then cover other major centres from next year onwards.

## Scitec Posts \$17.8m Loss

Despite a 15% rise in local sales revenue, Scitec Communication Systems has posted a \$17.8 million loss for the half year ended 31 December 1992. The loss follows the \$15.1 million write-down of intellectual property after the cancellation of an R&D syndication contract and costs associated with Scitec's failed European operations. Sales for the period were posted at \$16.19 million and the company posted an operating loss of \$65,000.

CEO and Managing Director, Hartmut Boedefeld, said that to him, the abnormal write-offs "were like making a clean sweep of history and starting over to prove to the world that we are a viable company."

## CEOs For Com Tech Forum

In only its third year, Com Tech's annual Open System Forum has already garnered enough prestige to attract Chief Executives from three leading US networking vendors.

Delivering keynote addresses at the Hyatt Regency Hotel in Coolum on Queensland's Sunshine Coast will be: SynOptics Communications' President and CEO, Andrew Ludwick; Joel Applebaum, President and CEO of Univel; and Steve Frankel, President and CEO of Retix.

Scheduled for March 12-15, the Forum will have four strands — Networking, Groupware, Internetworking and Unix — and also feature speakers from Novell, Lotus and Proteon.

## In Brief

**Austel** has decided to launch an investigation into wireless Personal Communications Services (PCS) following a request by Transport and Communications Minister, Senator Bob Collins. The industry regulator will accept submissions until April 1 and will deliver its report by the middle of the year.

**Telecom Plus** has announced enhancements to its SprintNet via OTC service that will almost double its capacity and provide for the introduction of frame relay services by the middle of this year.

**Ericsson Australia** has won a \$10 million order to upgrade 63 Telecom AXE switches with new software, known as AXE Plus. Rob Brooker, Ericsson's Director of System Design and Engineering, said many of the new services to be provided were tailor-made to meet Telecom's requirements.

**Nokia Telecommunications** has won a contract with OTC Maritime for the supply of its Actionet trunked radio infrastructure equipment for the Victorian Public Sector Mobile Radio Network (VPSMRN). Nokia will supply seven mobile exchanges, a system exchange and over 100 trunk radio base stations.

**Andrew Australia** has appointed MN Information Technology (MNIT) Group as a distributor of Andrew Token Ring LAN and router products. Russell Morgan, Andrew Australia's Data Products Manager, said that MNIT will help make Andrew products much more accessible than they have previously been.

**Vodafone**, owner of Australia's Arena GSM mobile network licensee, has announced the successful completion of what it claims is the world's first 'short message' text transmissions using GSM. The capability will allow mobile telephone users to send or receive text messages at the same time as speaking.

**Infonet** and **Microsoft** will jointly develop a new family of enterprise wide desktop management system solutions and services. The products will allow managers to "better synchronise ongoing software updates and system configurations around the world," claims Infonet's Australian Manager, Kevin Ziebell.

**Philips** has won a \$10 million contract with the State Rail Authority of NSW to provide a state-wide voice and data radio communications network for its locomotives. The system will replace a pole-mounted track side telephone system and provide fast and reliable communications between drivers and train controllers.

**Austel** has announced that — under certain conditions — security and fire alarm activators and sirens are exempted from requiring an Austel permit. The exemption applies to devices used solely for providing security or fire alarm service which connect to a Safety Extra Low Voltage (SELV) circuit interface on Austel-approved equipment or Austel-approved equipment in conjunction with an approved SELV power supply.

**Bernie Smith**, who was previously General Manager, Maintenance and Engineering, with Australian Airlines has been appointed Director of Ericsson Business Communications.

**Ericsson Australia** last month launched Freeset, its DCT900-based cordless PABX system. The product can be interfaced to any PABX and comprises handsets, base stations and a radio exchange. It has also been released in the US and New Zealand.

**3Com** and **Network Systems Technology (NST)** will carry out a joint marketing program for Sync Research SNA conversion products in Australia following a similar agreement between 3Com and Sync Research in the United States. NST is the Australian distributor of Sync Research products.

**OTC** has launched a new service initiative designed to provide customers with a 24 hour single point of contact. From now on, all customer inquiries for dedicated and switched services will be handled through the OTC Customer Support Centre.

**AAP Telecommunications** launched its Vista long distance call product in late January. Vista will provide medium to large customers with a wide range of discounts, company officials say.

**Datacraft** has opened new offices in Hong Kong to serve as the headquarters of its Hong Kong and China operations. Datacraft has 22 sales and service centres throughout the Asian region and has had offices in Hong Kong since 1975.

## In Brief

**Belgium** is expected to have an independent telecommunications regulatory body soon as a result of pressure from the European Commission for the Belgian Government to comply with its 1989 services directive. Called the Belgian Institute of Post and Telecommunications (Bipt), the new regulator may be manned by experts from the state-owned operator RTT, which was recently repackaged as Belgacom.

**3Com Corporation** has signed an agreement to acquire Token Ring local area network hub specialist Star-Tek for \$US20 million. The agreement will see Star-Tek become a wholly-owned subsidiary of 3Com. 3Com also recently reported record sales of \$US147.3 million for the quarter ended November 30, 1992.

**TRT/FTC** is to resell capacity on the UK Post Office's Postline internal network, following the lapse of a reseller agreement between the Post Office and the UK's National Network. National Network has plans to build its own infrastructure and is investigating new arrangements with the UK Post Office.

**Cabletron Systems** has reported record operating results for its third quarter ending November 30, 1992. Net sales of \$US110.4 million represented a 42% increase over sales of \$US78 million in the third quarter of the preceding year, while earnings per share were up from 55 cents in 1991 to 79 cents in 1992.

**ITU** statistics reveal that the telecommunications infrastructure in the new republics in the former Soviet Union is inadequate. There is a waiting list for over 18 million lines and a need for around \$US90 billion investment to install 30 lines per 100 inhabitants by the year 2005, the report (*Telecommunications Indicators of the Former Soviet Union*), reveals.

**SynOptics Communications** reported revenues of \$US388.8 for the year ending December 25, 1992 — an increase of 57% over 1991. Net profit was \$US42.4 million, up 58% from \$US26.8 million in 1991. Net income for the 1992 fourth quarter rose 273% to \$US16.8 million compared to the same quarter in 1991.

**Cable & Wireless** has acquired a 40% share in Belcel, a joint venture company which will build and operate a Nordic Mobile Telephone 450MHz cellular network in the former Soviet Republic of Belarus. The company will initially invest \$US7 million in the network which will be provided by Ericsson.

**Alcatel Telspace**, a maker of microwave equipment and satellite earth stations, is to shed 347 staff from its plant in Naterre, Paris, blaming shrinking home markets and severe competition abroad. Meanwhile, Alcatel SEL has cut 400 jobs from its main plant and a minor plant in Stuttgart, Germany, to concentrate on production of transmission systems at the main Stuttgart plant.

**British Telecom** has launched a two year advertising campaign to prepare customers for the implementation of national and international numbering changes on April 16th, 1995 (which will be known as 'Phoneday'). Phoneday will see an extra digit (1) added after the initial 0 of most dialling codes.

**Lotus Development** has posted a revenue increase of 9% from \$US828.9 million to \$US900.1 million for the year ended December 31, 1992. The software company's net income rose 87% from \$US43.1 million (98 cents per share) to \$80.4 million (\$1.87 per share) over the same period.

**Northern Telecom** has secured a \$US270 million contract to supply American-made telecommunications equipment to Nippon Telegraph and Telephone of Japan. The new agreement involves the supply of DMS-10 equipment until 1995 and is an extension of a 1986 \$US250 million contract for 400 DMS-10s.

**Wolfgang Boetsch** has succeeded Dr Christian Schwartz Shilling as German Telecommunications Minister. Appointed in January, Boetsch is a newcomer to telecommunications and has never spoken on the subject in the German Parliament.

**Richard Butler** and **Moriya Koyama** have been added to the Pacific Telecommunications Council's Board of Advisors. Butler was Secretary General of the International Telecommunications Union from 1983 to 1989 and was awarded the Order of Australia in 1988. Koyama is the President of the Telecommunications Advancement Organisation of Japan.

## Unisource's Pan-European Plans

Unisource is preparing to become a pan-European operator after its recent recruitment of Swiss PTT Telecom as a partner.

The Swiss PTT signed a letter of intent in mid-January to take a 33.3% stake in the Unisource holding company, matching its existing stake in Unisource Satellite Services. Under the new deal, it will receive an automatic interest in Unisource Business Networks of Frankfurt to which it will devolve its data services.

First announced at Telecom '91 as a Dutch/Swedish joint venture, Unisource was launched in June 1992. It now employs 800 staff across Europe. The current move is designed to help position it as an operator of long distance voice and other services in the European Community, said spokesperson, Mieke Plaschek. Unisource may also be looking overseas and sources claim the company is seeking partners in the US and Asia. (Telecomeuropa)

## Russia Awards GSM Licences

Russian authorities recently announced the winners of GSM cellular mobile phone licences in 12 areas around the country. US RBOC US West, with two Russian partners will operate 10 areas. A Scandinavian consortium lead by Telecom Finland has won St Petersburg, while Bell Canada has won Moscow.

US West's partners are Intertelecom, a joint stock company that provides intercity and international long distance service in Russia, and Vart, a group of Russian telecommunications equipment manufacturers. US West with Intertelecom has won lic-

ences for Perm, Novosibirsk, Nizhny Novgorod, Blagoveshensk, and Petropavlovsk and the two have Memoranda of Understanding to operate in Samara and Bashkortostan. US West, Intertelecom and Vart have won licences in Sochi, Vladivostok and Khabarovsk.

Finnish Telecom's partners for the St Petersburg area are Norwegian Telecom, the St Petersburg Trunk Exchange Company and the Leningrad Post and Telephone company. Bell Canada is also understood to have local partners. (Telecomeuropa)

## Vodafone in German PCN Win

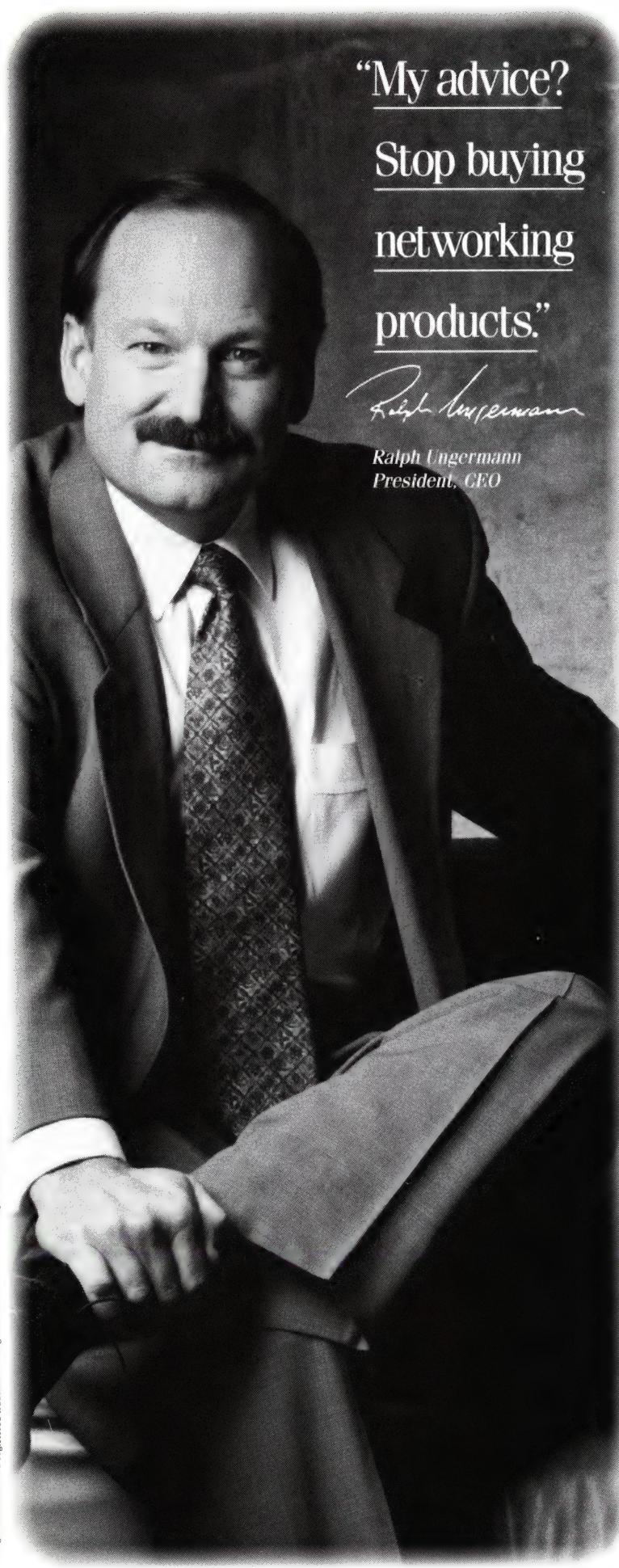
A mobiles consortium which includes Arena GSM owner, Vodafone, has won Germany's PCN licence. The consortium, which also includes Optus part-owner BellSouth and German-based Veba, beat a consortium backed by BMW, US West and GTE.

With construction due to begin this year, the DCS1800 network is to cater for around 3 million subscribers by the end of the decade. Some DM7.8 billion are to be invested in the network and a reported 8,000 jobs will be created. Major shareholders in the E-Plus consortium are: Thyssen AG (28%), Veba AG (28%), Vodafone (16%), Caisse des Dépôts (2%) and BellSouth (21%). (Telecomeuropa)

## MCI Posts Record Result

Buoyed by a 15% rise in annual traffic, MCI has reported an 11% revenue rise to \$US10.56 billion and a 13% rise in earnings to \$US589 for the year ending December 31, 1992.

Company officials have attributed the record result to a number of successes throughout the year, including the gaining of a \$US1 billion contract with the US Federal Aviation Administration and a \$US250 million deal with Citicorp. MCI also forged an alliance with Canada's Stentor group which yielded net revenues of \$US56 million. The company has also attracted 10 million customers to its 'Friends and Family' product since its introduction in March 1991.



## "My advice?"

# Stop buying networking products."

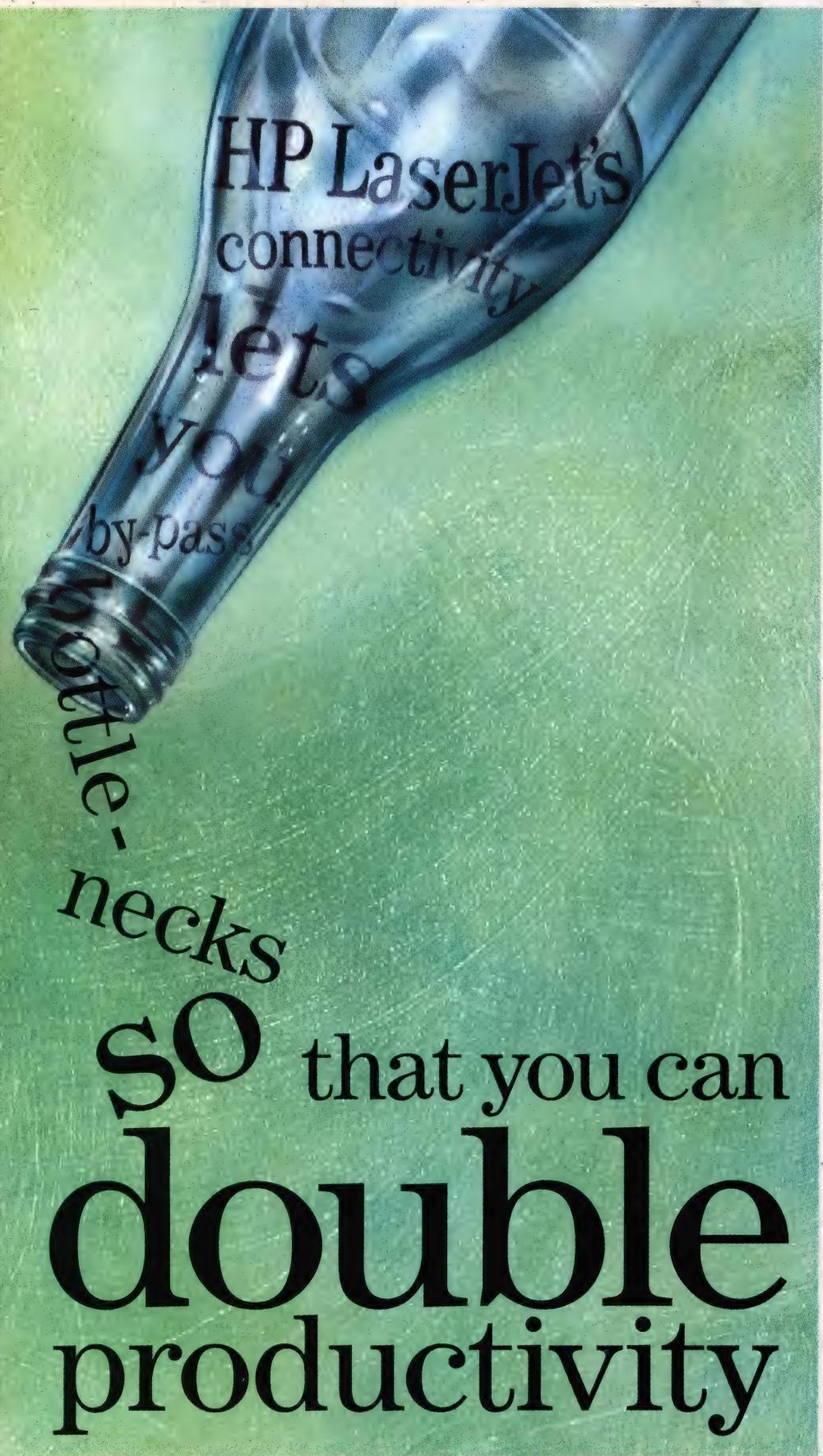


Ralph Ungermann  
President, CEO

Buy a networking *partner* instead.  Every week someone introduces a hot new networking product. But the IT managers I talk with say what's really important is not the latest box, but leveraging their investment for increased productivity and competitive advantage.  Our products are designed to meet your connectivity needs for today and tomorrow; a fact recognised by *LAN Magazine* when it voted our enterprise hub, Access/One, Hub of the Year in 1988 and again in 1992. The Access/One hub has continually evolved since its introduction, but our early modules can still co-exist with the latest release. For example, the new Virtual Network Architecture (VNA) provides virtually unlimited Ethernet segments in one hub. This provides workstations with dedicated Ethernet bandwidth.  Our leadership in design and manufacture of products is backed by a dedicated team of specialists in network design, implementation and engineering support. As a network integrator, we bring together products from several of our partners to provide customers with a total solution.  Together, we can implement business solutions that boost your productivity and provide a migration path to future requirements. If you think you need a networking partner and not just the latest box, call (03) 696 2006 or fax (03) 696 6483 for further information or a copy of our VNA booklet.

 **Ungermann-Bass**

Your Enterprise Network Partner



Supports all major operating systems



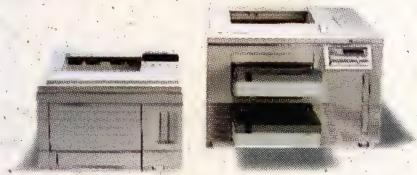
Increased speed



Location flexibility



Plug and play



Now you can print documents twice as fast as before. HP LaserJet network-ready printers let you by-pass the parallel interface bottlenecks and work close to full network speed. You have the freedom of being able to print from anywhere to anywhere without the need for dedicated print servers or attaching your printer to the file server.

No other printer company comes close to matching HP for connectivity options. One of the reasons for this advantage is the HP JetDirect card - which can also be fitted to most existing HP printers.

Of course as well as this connectivity advantage, you also get the usual added benefits you've come to expect from HP's LaserJet range - superior print quality, software compatibility, and reliability.

For information on HP LaserJet network-ready printers, or HP JetDirect cards for your existing HP printers, phone 13 13 47 or see your nearest HP dealer.



**HEWLETT  
PACKARD**

**A Better Way.**

# The Great Videotex Flop

Despite growing usage figures around the world, videotex has been a flop in Australia. Is Telecom to blame?

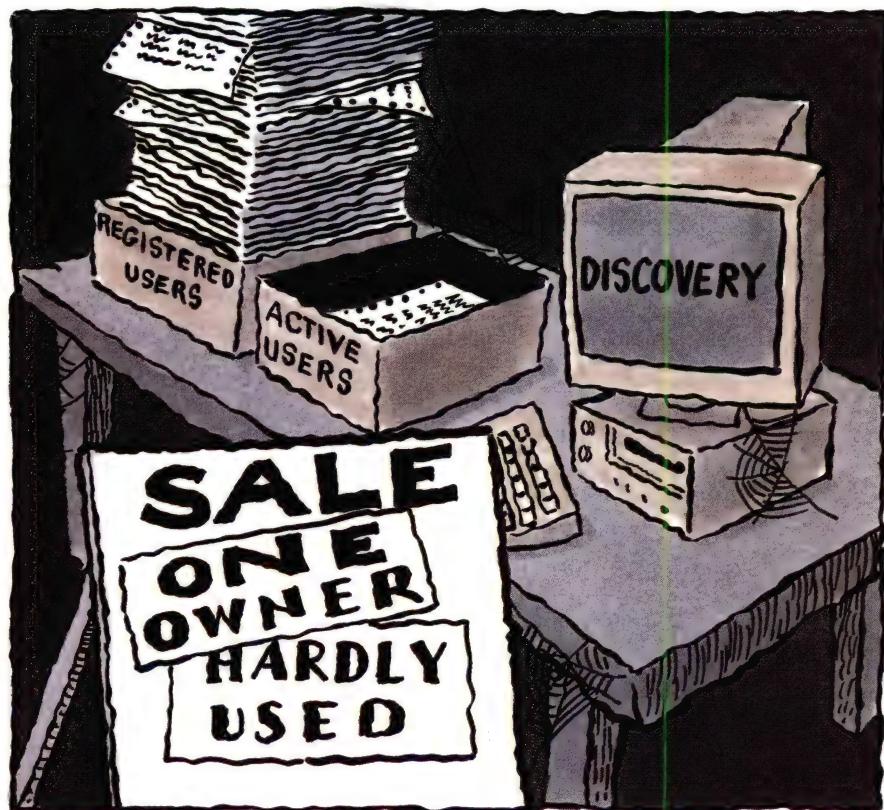
Out there in the ether of the Australian videotex world, a loud sigh of relief can be heard among information providers to, and the users of, Telecom's on-line information service, Discovery, now that AOTC's VAS/VAN wing has decided to sell the product to the private sector. The package, which has attracted the close attention of Info-One and CompuServe, includes the Commonwealth Bank's Telebank service, news agency services, racing information via various State TAB agencies and other racing groups, the financial service, Money Watch as well as travel information and electronic shopping guides. Everyone from PC hobbyists to computer boffs and smart housekeepers may now finally get the kind of services that have seen videotex usage soar overseas, while it has plunged in Australia in the past four to five years.

A combination of more stringent accountability obligations under the new *Telecommunications Act* and the slump in customer numbers has finally forced Telecom Enhanced Services (formed from the merging of Telecom Plus and OTC Enhanced) to reassess the viability of holding onto Discovery, run by subsidiary Telesoft Communications. The so-called 'business' end of Discovery, chiefly the Australian Securities Commission ASCOT database, which was part of OTC Enhanced's Dialcom operations, will be retained.

Just as it shut down Telemart, under accusation of cross-subsidisation by the Australian Direct Marketing Association and was forced to face up to some harsh truths about its EDI operations following similar accusations by NEIS (later confirmed by Austel), Telecom Enhanced Services has been forced to relinquish what it once envisaged to be a nice little earner that somehow went wrong.

From a 30,000-odd peak in users, Discovery's customer base is now understood to be around 15,000, though some industry observers have claimed it may be as low as 10,000-12,000. So what exactly did go so wrong in Australia, given the growth in Europe and the US (see the table on page 17)? Quite simply, it was a combination of mismanagement and arrogance, according to NSW-based telecommunications consultant, Paul Budde. Also greed, says Budde, who lists case after case of market overkill, even strangulation, by Telecom Enhanced and its earlier incarnation, Telecom Plus.

"Thanks to Telecom, the private videotex market never really had the chance to get off the ground," he said. "All went well until



1987-88, when Telecom became greedy and bought up individual videotex companies and used its monopolistic position to undercut private videotex systems," Budde said.

"They starved the private videotex market and within a short period there were only a handful of companies left who were involved in the videotex industry. On many occasions, service providers tried to persuade Telecom to cooperate with them and to build together on a viable videotex industry. But Telecom never accepted those invitations."

By trying to be the dominant service provider, Telecom Plus adopted practices which effectively shut out competitors, Budde said. One example of this occurred when Telecom bought the on-line financial information service, Money Watch, from the Fairfax group, according to Budde. "Once they had bought it, Telecom effectively prevented others from running a stock market service," he said. "They did it very cleverly by dropping any rival information service very low down the menu structure, making it laborious and time-consuming for users to access."

Even the controversial sex memo service, similar to Minitel Rose which helped get France Telecom's on-line service up and

running, was monopolised by Telecom when some private Australian companies tried to enter the market. "Because of the media outcry at the time, Telecom banned the service, then did a deal later with *Penthouse* [magazine]," he said.

Even worse, according to Budde, was Telecom's use of prices to control the market. In the mid-1980s, he said, many service providers were forced to offer their services via Austpac rather than Telecom's less expensive Viatel network. This had impacted heavily on such groups as Park Lane Computing and the Elders Pastoral service, Farm-link, which provides quality information on farming and the agricultural industry.

By the time Telecom was forced by law to even out the price structure to allow more competition, it was too late, Budde said: The industry had virtually collapsed. As its customer numbers fell, and revenue dwindled, Telecom then decided to raise its income by increasing its fee to information providers from \$3,000 to \$12,000, Budde said. The result was that information service providers left in droves, the total dropping from 100 major operations and another 500 smaller ones to a handful — perhaps 25.

# No matter what your telecommunications needs, you must look at the bottom line.

No matter what type or size of business you are in, the options offered by the telecommunications industry can work to make it more efficient, effective and profitable.

But with options come questions. Questions that can only be answered at ATUG '93. The complete showcase of what's new and what's happening in telecommunications from hundreds of different suppliers.

It makes ATUG '93 the only way to make the right decisions, choose the right options and connect with the right suppliers. Make it your business to be there.

For conference details and registration, call (02) 965 4243.



**FREE ADMISSION TO BUSINESS PEOPLE**  
Riddell House 135-141 Burnley St. Richmond. 3121.  
On behalf of the Australian Telecommunications Users Group.

Avoid queues. Fax this form before 23/4/93 to preregister.  
Your admission Badge will be mailed to you.  
Riddell Exhibition Promotions. Fax Melb (03) 427 0829 Syd (02) 550 4345



People under the age of 18 years not admitted.

Name \_\_\_\_\_

Company \_\_\_\_\_

Industry \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ P/Code \_\_\_\_\_

Phone: (\_\_\_\_\_) \_\_\_\_\_ Fax (\_\_\_\_\_) \_\_\_\_\_

**10th Australian  
Telecommunications  
Exhibition & Conference.**

**Darling Harbour,  
Sydney, Australia.**

**May 11-13 1993.**

**Open 9am-6pm Daily.**

**Atug'93**  
10th Australian Telecommunications  
Exhibition & Conference

## Public Videotex Users

|             | 1988      | 1990      | 1992      | GROWTH 88-92 |
|-------------|-----------|-----------|-----------|--------------|
| AUSTRALIA   | 32,000    | 25,000    | 16,000    | -50%         |
| UK          | 85,000    | 110,000   | 120,000   | 41%          |
| GERMANY     | 100,000   | 147,000   | 260,000   | 260%         |
| FRANCE      | 3,500,000 | 4,200,000 | 5,500,000 | 57%          |
| ITALY       | 15,000    | 27,500    | 146,000   | 87%          |
| SWITZERLAND | 8,000     | 14,500    | 60,000    | 650%         |
| JAPAN       | 30,000    | 89,300    | 111,000   | 270%         |
| FINLAND     | 5,000     | 12,500    | 89,000    | 680%         |
| USA         | 2,000,000 | 2,600,000 | 3,100,000 | 55%          |

Source: *Telecommunication Strategies Report*, Paul Budde Communications, July 1993

Budde claimed another mistake was that Viatel/Discovery's sales and marketing efforts were expensive, but poorly focused. Telecom had also forsaken golden opportunities to grow the market through alliances with large groups such as Dick Smith Electronics and others. Another problem was that Discovery was grossly over-staffed, with a headcount of 125, Budde said, adding that he had stated publicly last year he could have run the service with 10 people.

### Telecom Unresponsive?

Despite the fact that most of Discovery's big clients and service providers long pushed for price cuts and more cooperation from Telesoft to help expand the market and reverse the decline in customers, very little actually occurred beyond 1988-89.

Among those who strongly promoted a new era of cooperation and dialogue was one of Discovery's top three clients, the Commonwealth Bank, with around 1,200 branches in Australia, whose Telebank service experienced a shrinkage in its client base from 7,000 to below 6,000 users after videotex fees were re-packaged in 1990, with common monthly business and non-business leasing costs, new interconnect charges and a joining fee of \$60.

The Commonwealth's Home and Office Banking Manager, Gavin Napier, told *Australian Communications* the bank had made several approaches to Telesoft to introduce a fixed monthly charge for users of its Telebank service. To support the proposal, the Commonwealth had also provided statistics on Telebank usage, covering such things as frequency of log-on, the number of transactions and how many users were active and inactive. "We confidently expected that many lapsed users would come back to the service if our proposal was accepted," Napier said. "We also guaranteed to quarantine these particular Telebank users so they could not access other Discovery services.

"Despite its relatively small clientele, Telebank remains a good business, but of course we would like to see it expand because, among other things, it saves the bank

money on transaction costs." Napier said that if Telesoft had been serious about expanding the videotex market, he would have expected the company to approach the Commonwealth and the other big users to ask them what they wanted. "Providing information services is no longer a technological task; it's marketing, and they should have woken up to this," Napier said.

"I don't want to put in the boot, but it would be true to say Telesoft did not always communicate with service providers very well, and often did not listen to what we had to say. But on the plus side, they did make the database look and operate much better in the past two years.

"Our research indicates that Telesoft could still have made money if they had charged smaller users a monthly fee of, say, \$30, including subscription, with no limits on the number of times the user logs on or the time spent on the system."

In response, Telesoft's Managing Director, Maureen Murphy, said: "We assessed the proposal on an individual basis, and decided not to change the price structure. But the Commonwealth Bank had no right to dictate pricing structures for the entire industry. Given the quality of the Discovery service, our prices have been inexpensive compared with Info-One, Reuters, Lawpoint and even CompuServe."

Murphy, who worked for Money Watch when it was bought by Telecom in 1985, is pilloried by some over Discovery's decline, but praised by others for leadership qualities that at least helped keep the operation afloat. Most of the shrinkage in the customer base could be attributed to the fall-off in computer game users and hobbyists, who did not generate significant revenue compared with the corporate sector, she said.

"Revenue is more important than the number of customers, and that fits in with the (AOTC) Board's position and the Austel guidelines to become a self-supporting unit without cross-subsidisation."

"When we looked at our client base, we found some 20% were providing 80% of the income so it was logical to concentrate on

the business end of the market. "We could have done what the French did with Minitel and spend hundreds of millions of dollars and been prepared to trade at a loss for years. They may have a huge client base now, but they won't reach breakeven point until 1996," Murphy said.

### Who Wants It?

According to General Manager of Telecom Enhanced Services and Maureen Murphy's superior, David Rolls, a decision was taken a year ago to merge the corporate end of Discovery into AOTC's core value-added operations. Meanwhile, two alternatives had been considered for the retail end. The first was to reposition it within the consumer division; the second was to sell it off, he said. "In the end, we decided the best option was to sell."

Sydney-based Info-One's primary business is operating the Computerised Legal Information Retrieval Service (CLIRS) and top-end databases for the mineral and resources industries. The company also has up to 70% of the compact disc market for Australian commercial information, producing customised CDs for the Australian Stock Exchange, building standards CDs for Standards Australia and CD manuals for the Commonwealth Public Service.

Founded in 1984 by the Computer Power Group under Roger Allen, Info-One was eventually taken over by Westpac, then bought out by its management when Westpac returned to its core business in 1990.

Info-One Managing Director and majority shareholder Edward Tracey told *Australian Communications*: "We have 3,000 customers at the high end of the on-line market and we have very much wanted to get into the retail end of videotex. We have the infrastructure and we know how to run an on-line service." Tracey added that Australia had fallen "miles behind the rest of the world" in videotex services because "there has never been a critical mass here."

CompuServe Pacific, licensed by Fujitsu Australia from US-based CompuServe Inc., provides over 1,500 services to the Australian and New Zealand market. Its easily accessible services range from business and finance news to academic reference works and a raft of other services covering entertainment, travel and shopping. While the company established a foothold in Australia around two years ago, it has been seeking to expand its local customer base through reciprocal access agreements with local online information services.

Budde, who wrote the original 1983/84 marketing and pricing blueprint for Discovery's predecessor, Viatel, opposes the CompuServe bid on the grounds that Discovery would have to shut down in its present form and the customer base merely added on to CompuServe's 80-column technology.

*Bernard Levy is a freelance journalist based in Sydney.*

**New Zealand**

## Clear and Telecom Back in Court

The two year legal fight to break Telecom Corporation's monopoly on New Zealand's local calling market entered a new phase in February when Clear Communications took Telecom back to court.

Clear's latest litigation is on two fronts, first it has gone back to the High Court to ask for an injunction forcing Telecom to provide a direct-dial-in (DDI) service for a specific Clear customer. This, says Clear, is merely an enforcement of an earlier High Court ruling made on 22nd December 1992. Ironically, the customer Clear has lined-up is the Justice Department which administers New Zealand's courts, as its first DDI customer.

However, while Clear is seeking to enforce part of that decision, it has launched a second action in the Appeals Court against other parts of the December 22 decision calling them 'wrong and misleading.' Clear says the pricing model used by Telecom and approved by the High Court is flawed. It is also claiming that costs should be awarded.

Both actions were launched while delicate negotiations between Clear and Telecom New Zealand on giving Clear access to the huge market for local callers were still in progress. These talks had only just started

and were a direct consequence of the early round of litigation. Not surprisingly, the talks have since broken down.

Clear says that is reading of correspondence from Telecom New Zealand infers that the corporation is denying DDI access in clear breach of the earlier High Court decision. One point at issue is the mode of local call access. Clear seeks DDI access. Telecom, on the other hand, regards DDI as an interim measure and would like a longer term option negotiated. Clear agrees that DDI is an interim measure, but wants it while a longer term solution is negotiated.

Clear currently competes with Telecom New Zealand for its toll and international business. In less than two years it has wrestled a handsome 16% market share in national tolls and has been the catalyst behind a series of toll rate decreases. But Clear believes it can be even more successful if it can have access to local calling — currently a Telecom New Zealand monopoly.

Telecom New Zealand has argued consistently that the quid pro quo or local market entry should include a renegotiation of its 'Kiwi Share' obligations. These are a set of promises made by the New Zealand Government before Telecom was sold.

According to Telecom New Zealand, the cost of keeping its Kiwi Share obligations comes to around \$NZ250 million a year. Telecom would like either to be released of its obligations, or for Clear to be forced to contribute towards this cost.

Clear's earlier action accused Telecom of overcharging for local access and argued that it abused its monopoly position.

In his decision, Mr Justice Ellis agreed Telecom New Zealand breached the *Commerce Act* by asking too much money from Clear to connect its rival to the local phone market. He then provided a framework to the two rivals to negotiate a local connection agreement and ordered them to the table (see *Legal Line* on page 49). Details of the amount charged by Telecom have not been made public. However, the charge includes a call charge fee and an access levy payment as well as the physical installation of trunk lines between the two networks.

The court found Telecom was also in breach for not accepting Clear as an ordinary DDI customer. However, the earlier action is seen by many as a draw. Mr Justice Ellis did not award costs to Clear and he agreed that the way Telecom priced its service was acceptable. He suggested that Clear might be entitled to damages, but that these could well be absorbed by the negotiated terms of interconnection.

During the action, Mr Ellis was helped by Melbourne economics professor Maureen Brunt. At one point the case took on a slightly bizarre aspect as the court shifted to Los Angeles to hear evidence from an expert witness unable to travel to New Zealand. Clear's legal bill for the original High Court action is said to be around \$NZ1 million.

**Bill Bennett**

**Standards**

## Standard, Deluxe or Proprietary?

The opposite of 'standard' to a technologist is 'proprietary' or 'non-standard' and both terms carry negative connotations in this age of open-systems and interoperability, but ask any sales person what the opposite of standard is and they will probably say *deluxe*.

This is the dilemma facing policy makers in DOTAC, network planners in the carriers and regulators in Austel. If rigorous standards are enforced for the interface by which public network telecommunications services are made available to customers then Australia will avoid the cost and inconvenience of customer equipment which will only work on one carrier's network, but Telecom, Optus and any other carriers who enter the market after 1997 could be constrained to offering 'standard' as opposed to 'deluxe,' services offering more features and facilities which give the carrier a competitive edge over its competitors.

The problem surfaced for the first time late last year when Optus informed Austel of its plans to offer a digital connection between a PABX and the public network over a 2Mbps

link (large metropolitan customers will be connected directly into the Optus network).

At present, on the Telecom network you can interconnect PABXs digitally via 2Mbps links, and you can connect them digitally into the public network over a 2Mbps link if you opt for Telecom's Macrolink ISDN service. If you simply want to use normal PSTN services then you use the analogue ports on the PABX and convert these to a digital signal which can be carried on the 2Mbps link. The proposed interface would give users the quality of the all digital connection used in ISDN, but without the cost.

### Austel's Fears

Telecom, however plans to offer a different and incompatible version of this interface. Both interfaces comply with CCITT recommendations, but these recommendations specify only which bits shall be used for signalling purposes, not precisely how they will be used.

One argument is that the services supported by using the bits in different ways should be regarded as supplementary services which the carriers can offer to differentiate their services from their competitors.

Austel does not agree, but it does not have power to set standards for the customer interface of carrier services, only for the customer equipment which uses those inter-

faces. It has issued a revised draft of Technical Standard TS003 to include support for both the Optus and Telecom proposals and has indicated its strong disapproval of a dual standard approach, fearing it will set a dangerous precedent for the post-1997 multi-carrier regime. Austel hopes that during the comment period allowed for the draft, suggestions will emerge on how a single standard might be established.

If co-operation and collaboration do not provide the outcome Austel seeks, legislation might. Last year, a draft of a Ministerial direction was circulated which, if issued to Austel, would have given Austel power to set standards for public network interfaces.

At present, the proposal seems to have disappeared without trace, and the indications are that there is little likelihood of it resurfacing until Austel has come to grips with the lesser but nevertheless difficult question of setting standards for end-to-end performance of interconnected public and private networks. These relate to the curly old question of how you allocate the permitted number of quantising distortion units introduced into a network and hence how much voice compression private network operators can use. Answering that question is expected to take another year at least.

*Stuart Corner is the Editor of Exchange.*

# Proteon.

# Nobody has a better track record in Token Ring internetworking.

As networks become linked, it is reassuring to know Proteon is involved in supplying the physical interconnectivity.

Proteon, pioneers in Token Ring technology, provide the adaptors, smart hubs, bridging routers and network management, fundamental

in connecting diverse hardware platforms. Network environments based on IBMs SNA, DEC's DECNET and the myriad range of PC Lan and UNIX workstations can all be connected by Proteon's advanced internetworking infrastructure.

#### 1st in Harvard Benchmark Test

Proteon's RISC-based CNX 500 Bridging Router has rated top performer in the 1991 and 1992 Harvard Benchmark Test. This independent test measures speed and throughput in multi-LAN, diverse environments among 15 of today's vendors of bridges and routers.

It is not surprising that top Australian companies who are bringing their remote and local networks together on a price/performance basis are turning to Proteon.

#### Free Internetworking Booklet

If you would like to know more, write for a free copy of "Taking the Mysteries Out of Internetworking - A Manager's Guide", or contact Rob Willis on (02) 412 0050.



**proteon**

Token Ring to Everything.

**Mobile Communications**

## Can Mobile Phones Fry Your Brain?

They won't go away, those stories that radiation from mobile phones can fry your brain or more subtly, disrupt the regenerative processes of your cranial tissue so that a tumour develops. And for every story alleging dangers there's one that quotes an eminently respectable scientist from an eminently respectable research establishment claiming that the results of a meticulously conducted research program have failed to find one shred of evidence in support of the supposed dangers. Nevertheless, the chances are that somewhere the same story will make mention of yet another research project into the very same question. So it goes on.

One of the first references to the problem occurred early in 1990 when hysterical reports quoted an eminent Danish scientist, Tage Iversen, Director of the State Inspection Authority. It was Iversen who was alleged to have said: "The question is whether cellular phones would have the same effect a microwave oven would have if you stuck your head inside while it was on."

Well, the answer is obvious. No, it does not or every mobile phone user's head would explode about three minutes into the conversation. Equally obvious, the answer is yes, it does have the same effect: It is the same type of energy and has the same heating effect but to a lesser degree, consistent with the lower power level. The question is: Is that degree of heating sufficient to be dangerous?

The simple answer appears to be no. The heating effect of the power levels used in cellular mobile phones is not seen as being dangerous. However, there is the possibility that the transmission and reflective properties of the cranium and brain tissue at the frequencies in question could cause the skull to act as a reflector, focussing the radiation

on a particular position in the brain in just the same way as a satellite dish focuses the signal on the detector at its centre.

Telecom Research Labs set up a macabre-looking experiment in which a mobile phone was strapped close to a human skull filled with a synthetic 'brain' — a gel which was designed to emulate the radio frequency transmission properties of the brain.

TRL's Ken Joyner said he believed the research to be two years ahead of any undertaken elsewhere. It found no measurable temperature rise (except from the phone, which was switched on for long periods). However, he conceded that further research would be needed as new technologies operating at higher frequencies were introduced.

In July 1990 the Mobile Communications Group of the European Telecommunications Standards Institute (ETSI) recommended further study on the issue and convened a major conference to examine the question. That conference was held in Nice in January 1991 and was attended by over 80 specialists. Their assessment was to give mobile phones the all clear, but with minor reservations. They agreed to 'continue to improve the relevant standards and to gain a better understanding of the different phenomena, both thermal and non-thermal.'

And it is these reservations that keep niggling away. In spite of the ETSI conclusions, the UK's Radiological protection Board last year agreed to fund a £500,000 three year study into the effects of radiation from both existing and planned personal communications technologies.

The latest scare, from the US, concerns the husband of a woman who died from a brain tumour suing the mobile phone company and the supplier of the mobile phone. It prompted another flurry of stories in the press with the *Wall Street Journal* reporting: 'Motorola executives (not the company being sued) cited only a single unfinished study as proof that radiofrequency waves operating in the cellular band don't promote tumour formation.' They cannot have look-

ed very hard. Telecom in 1990 completed a three year study looking for evidence of genetic damage in its workers routinely exposed to radiation at the gamut of frequencies from 400KHz to 20GHz.

The Australian standard for the level of occupation exposure is five times higher than non-occupational exposure, which is itself higher than levels expected from mobile phones. The study was claimed to be the first of its kind in the world, and it found no evidence of genetic damage. Yet the question remains and studies are still continuing. The study mentioned in the *Wall Street Journal* used human cells in a petri dish: Its next phase will be to examine the effects on rats, and that will take two years to complete.

The real problem is that it is not acceptable to do controlled experiments on live people. So unfortunately, we will just have to wait and see if the danger is real. Just as with smoking, continued exposure by many people over a prolonged period will give us an almost irrefutable body of evidence. What then — a flood of legal suits by tumour-ridden phone users or their bereaved relatives?

Remote though the possibility may seem today, it is one which must surely have the manufacturers and the network operators worried. Unlike legal actions associated with smoking-induced cancer, the evidence is water-tight. The service providers records will show who supplied the telephone, and to the minute, how much it was used, for as long a period as the records are kept.

Investors are already taking fright. Motorola shares fell 20% after the tumour story hit US TV screens. The largest cellular service provider, McCaw Cellular, lost 15% of the value of its shares.

Finally, there is one well documented health hazard of mobile phones: Yuppie Ear. It was first noticed in the UK in 1990. The first known victim attempted to answer his mobile phone in the dark, thrust the antenna into his ear and perforated his ear drum.

*Stuart Corner is the Editor of Exchange.*

**Mobile Communications**

## Victoria, NSW Woo Arena GSM

Third mobile licensee Arena GSM expects to make a decision later this month on whether to base its headquarters in Sydney or Melbourne — a decision that will establish the launching pad for major equity holder Vodafone's grander Asia-Pacific ambitions. In the process, Arena GSM has been the subject of intensive lobbying by both cities and State Governments.

"We've had presentations from both governments, at ministerial and departmental levels, involving Peter Collins in NSW

and Phil Gude in Victoria," Arena GSM Managing Director, Philip Cornish, said.

While Sydney would appear to be the logical choice, not least because of the fact that its consortium partner, the AAP Group, is headquartered there, Cornish insisted the final decision would not be announced until a day or so after the first quarterly meeting of the Arena GSM Board on March 26.

The Board will comprise directors from Vodafone Group, the parent company of Vodafone and Australian directors "of substance," who were presently being selected, according to Cornish. "But whatever choice is made, we will have offices and separate management groups in both Sydney and Melbourne, just as AAP Group does," Cornish said. "But will not automatically be influenced by AAP."

Once the key headquarters question is resolved, Arena will begin to offer services in Sydney, Melbourne and Canberra from September 1, then expand in 1994 to Adelaide and Perth as well as to the Brisbane-Gold Coast conurbation. Most metropolitan regions of Australia will be covered by 1996.

While Arena has no short-term estimates of its customer base, Cornish said he confidently expected the service to attract one third of all new subscribers.

Arena would also tap into the major business and corporate customer base of the AAP Group, just as Optus had done with its local equity partners, Mayne Nickless, AMP and National Mutual. He agreed that the synergies between Vodafone and AAP, as a supplier of voice and data transmission systems to businesses, gave Arena the potential



## Thanks to Ericsson, the on-site communications at Barcelona were also of Olympic standard.

Being able to maintain instant contact with key personnel at the 92 Olympics presented Ericsson with an enormous logistical challenge.

But with Ericsson's new Freeset cordless telephones in hand, officials, technicians and VIPs were free to roam. Making and receiving calls wherever they went in the Olympic complex.

The Ericsson Freeset system was fully integrated with the Games' main PABX. So users could also have outside calls diverted to their phone.

Freeset's versatility makes it an indispensable business tool across a wide range of environments. From hotels and hospitals, to warehouses, convention centres and universities.

So if you'd like your business communications to be the best in the world, call Ericsson.

**Freeset**  
TELEPHONES THAT MEAN BUSINESS

Vic (03) 487 5700 N.S.W (02) 805 4999 QLD (07) 262 6222  
S.A (08) 234 5555 W.A (09) 262 6222 A.C.T (06) 257 1033  
Tas (003) 31 2544 P.N.G (675) 25 6566

Sanford Vick 1507

**ERICSSON**

to become a general network operator once the AOTC-Optus duopoly ended in 1997.

Cornish said research showed that a mobiles service needed 200,000 subscribers before it could become self-supporting, and Arena was studying the long-term picture in multiples of two years or half decades.

He said Arena, like AOTC MobileNet and Optus, would be largely relying on the rising groundswell of demand for mobile communications. He accepted figures contained in a report by consultants, BIS Shrapnel, that mobile phone subscriptions would increase by 150% in the five years to 1997, rising from more than 500,000 at present to over 1.25 million. With Optus claiming it will win 30% of the new business, and AOTC almost certain to capture between 50%-60%, Arena may have to settle for closer to 20% than the 30-plus it is hoping for.

"Fortunately, mobile telephony appears to be a recession-proof business, with the highest take-up rates during the depths of the recession," Cornish said.

## Industrial Relations

### AOTC, CWU Get Down to Business

Having reached a milestone with AOTC last month in the form of a national enterprise agreement centred on an 8% pay rise and higher productivity, Australia's major telecommunications union, the Communications Workers Union (CWU), still faces one of the most gruelling tasks of its relatively brief existence.

The CWU must now get down to the nitty gritty of bargaining with 25 different sub-business management groups, which have been given the right to customise their own industrial relations policies, based on the national enterprise agreement.

The union is now in intensive talks with AOTC's Consumer, Commercial and Corporate and Government sections as well as the various sub-businesses of the Enterprise Group such as Mobiles, Directories, Operator Assisted Services, Pay Phone and Broadcasting. The negotiations are due to be completed by the end of April and implemented by June 30, when the second stage of the national 8% wage increase will be paid. The third stage will be paid on December 31, again subject to progress on productivity initiatives.

AOTC CEO, Frank Blount, hailed the vote by the CWU's 50,000-odd members in favour of the national agreement as a turning point that would allow staff to receive higher than the agreed 8% pay rise. The deal also offered incentives and bonuses of up to \$1,500 for improved customer service and higher productivity levels which would help AOTC reach its financial targets in 1992-93

Cornish rejected any notion of a tariff war to boost Arena's market share, saying the company would rely on aggressive sales and marketing techniques and Vodafone's patented GSM-compatible Micro Cellular Network (MCN) technology, which would reduce mobile charges by up to 25% and expand the market to domestic users who required local coverage and did not want to pay for a high-end national service.

The company has already committed itself to spending \$400 million on infrastructure, with a 60% local content guarantee that will see business flowing to Australian equipment suppliers and service providers. High on that list will be equipment manufacturer and service provider, Exicom, of which Cornish was the founding managing director from 1986-1991 after cutting his teeth organising electronic venture capital start-ups.

At a relatively young 36, Cornish has been working closely with seasoned Vodafone Project Manager, Ted Satchell, who has been involved in all major business discus-

sions, including interconnection talks with AOTC and Optus. While the possibility of an alliance with Optus was "up in the air," Cornish said the necessity of interconnect meant that "all players must cooperate with each other to deliver a service." More pointedly, Arena expects to trunk up to \$300 million in international call traffic through AOTC or Optus in the next decade.

Signalling that AOTC is more than ready to meet the new competitor, MobileNet's National Manager, Strategy and Business Development, Dr Reg Coutts, said: "We are number one now, and we intend to stay number one." Describing Arena's MCN as "a pimple on GSM technology," Coutts said that while MCN would introduce a new element in tariffing and allow charges to be based on time of day, monthly access and air time, MobileNet would match this by having the same capability in the marketplace.

*Bernard Levy is a freelance journalist based in Sydney.*

and 1993-94. A single lump-sum payment of \$500 would be paid to employees if corporation-wide customer service and financial targets were met this year. A further \$1,000 would be paid if company and business unit customer service and financial targets are reached in 1993-94.

The incentive payments cover five categories, each worth \$100, hinging on surveys to be conducted until June 30. The surveys will have to reveal that at least 63% of new customers felt they had received very good or excellent service. At the same time, 66% of customers using Telecom operator-assisted services will have to be very satisfied, along with 57% of those having services restored and 60% asked about call quality. A far lower 40% target has been set for the survey on quality of billing.

In the sub-business negotiations, there are nine major business units, but a total of 25 different bargaining groups for the CWU to deal. "The negotiations will definitely be a strain, but at least we got it down to 25 groups. Some Telecom management even wanted to have regional negotiations; they had huge wish lists," said CWU Senior Vice President, Col Cooper.

AOTC Group Managing Director, Commercial and Consumer, Doug Campbell, confirmed that AOTC was sparing little expense in educating its business unit management in the fine art of industrial relations elbow wrestling. Campbell said the pressure to cut staff derived from the corporation's thrust towards world-best practice. "But the telecommunications industry as a whole has continued to grow strongly, and this can only be good for the unions," he said.

Revealing that AOTC's total staff was now 70,500 — down from 95,000 in 1986 — Campbell refused to be drawn on the question of an 'optimal' staff level, though

figures as low as 40,000-50,000 have circulated in the industry for some time.

Campbell defined the issue in terms of catching up with the cost-efficiency ratios of other international operators. "In pursuing world-best practice, we benchmark ourselves against the UK and the US, but we are well behind them at present. In the next two to three years, we hope to close the gap, though we may not be able to do so as quickly as we first thought because of the rapid changes in those markets."

History dictates that the CWU-AOTC relationship is very different to the somewhat cut and dried one the union has with second carrier, Optus, which is based on an enterprise agreement ratified by the Industrial Relations Commission in November last year. In effect, Optus all but ignores the union's existence and focuses on staying ahead of the employee-boss game by setting productivity targets and rewarding hard work. "We may have a dozen CWU members, or 30; we really don't know or care," Optus Human Resources Director, George Webster, told *Australian Communications*. "We keep the federal level of the CWU updated on what's happening on the business front and we allow them free access to staff. But we have spent about \$20 million in total on training and we try wherever possible to support the personal aspirations of our staff; confrontation is the last thing we want."

Aware that it isn't exactly capturing the hearts and minds of Optus staff, the CWU has launched a campaign based on superannuation and other benefits and is optimistic about recruitment at Optus, just as it is with third mobiles licensee, Arena GSM, with which it has had preliminary talks.

*Bernard Levy is a freelance journalist based in Sydney.*

# Solutions

**Networking Multiplexers  
for  
Voice  
Data  
Video and  
ISDN Applications**



**A complete family  
including support for  
smaller sites**



**Data only applications  
supported by  
Advanced ISDN  
Terminal Adaptors**



**Intelligent PC  
Add In cards for  
Advanced DeskTop  
Applications**



**Comprehensive yet  
affordable  
Network Management**



**Lead Office**  
je tec Pty Limited  
ACN 003 169 088  
Unit 3  
18 - 122 Bowden St  
Lindfield 2114  
NSW Australia

**Phone**  
International 612-809-6933  
Sydney 02-809-6933  
Melbourne 03-263-0200  
Brisbane 07-229-9137  
Canberra 06-256-3480  
Europe 35-321-277-422

**Fax**  
International 612-809-6619  
Sydney 02-809-6619  
Melbourne 03-263-0215  
Brisbane 07-221-6625  
Canberra 06-201-3003

**United States**

## AT&T Sues MCI For Patent Infringement

After years of battling it out on the long distance front, MCI and AT&T have once again moved their war into the court house over charges of patent infringement. AT&T claims that MCI has infringed on 10 of its patents since 1987. In retaliation, MCI has hit back at AT&T by counter suing to prove that the patents are unenforceable.

This latest confrontation might look like a local spat but it has international implications. Regardless of whether AT&T wins or not, industry observers believe the suit might hurt MCI's plans to license its intelligent network software worldwide.

While AT&T claims that MCI has been infringing on its patents for seven years, what triggered the new court conflict was MCI's move to license its technology to Stentor, a consortium of telecom companies in Canada, in September of 1992. As part of the agreement, Stentor paid \$US150 million to be able to use MCI's software to offer MCI-like business and residential services to Canadian users. While the Stentor deal was the first of its kind for MCI, the US carrier says that it is pursuing similar agreements around the world. However, the Stentor deal was the final straw for AT&T.

"We are not going to let MCI ride on the coat tails of AT&T and cash in on our \$US3 billion annual R&D investment," said Mike Granieri, a spokesperson for AT&T. "It was one thing that they were violating the patents here in the US, but when they went ahead and sold the technology outside of the US then we knew that there was no other option but to enforce the patents."

Granieri added that AT&T is also exploring what remedies it may have under its Canadian patents with respect to MCI's activities in Canada. According to AT&T the Stentor deal violates four AT&T patents.

But MCI not only believes that AT&T's patents are unenforceable, it also contends that the carrier lied during the 1984 Modified Final Judgment (MFJ) hearings of its breakup. According to officials at MCI, its counter suit is based mainly on the fact that its services are totally different and the technology was already in place when AT&T filed for its patents.

The specific patents that AT&T claims have been violated by MCI encompass AT&T 800 (toll free) service enhancements and advanced features; Software Defined Network capability techniques for controlling toll fraud abuse; credit card processing and verification technology; and the branding of several types of telephone calls with an audible company logo.

In the suit filed in the US District Court, AT&T is looking to receive damages and future royalties from eight patents MCI has allegedly violated. AT&T is asking the court to grant its request that MCI pay more than the standard 2% royalty rate for its 'willful' violations of these patents. The remaining two patents cover the queuing and routing of 800 (toll free) calls among multiple locations and the control of toll fraud abuse.

"AT&T wanted to settle these issues amicably and out of court but MCI declined," said Judith Maynes, Vice President, Law, for AT&T.

The basis of MCI's defence is that AT&T patented technologies that were already widely in use. In legal terms part of MCI's defence is it is trying to prove 'prior art' which means that a patent cannot be issued or enforced for a technology or product that was already being used or known about.

In the court filings MCI states: 'Prior to the date AT&T applied for them (the patents) the claimed subject matter of the patents at issue was known and used by others, or would have been obvious to persons skilled in the telephony art. This was known to AT&T before certain patents, and on information, and belief all of the parties were issued and not disclosed by AT&T in a timely manner to the Patent and Trademark Office.'

The other aspect of MCI's case centres around AT&T's lack of declaring its patents prior to the MFJ statements that its patents could not be used to impede competition and there was no obstacle to competitors offering services in the manner claimed. MCI points to the 800 database patent called the Weber patent, as an example that AT&T's patents are unenforceable and believes that AT&T knowingly withheld information that would have affected how other 800 database systems and services were created.

According to MCI, during the MFJ hearings in 1984, AT&T was specifically asked if there were any patents that would impede the new start-up carriers from developing their own databases and AT&T said no.

Because AT&T did not disclose any information that it had patented its 800 services, the District Court told the newly formed RBOCs and other interexchange carriers that they would have to develop their own databases if they were to offer 800 toll free services such as those offered by AT&T. Because of that, MCI claims that it built its own totally different 800 system and service. Then, a few years later, MCI states that AT&T pulled out the Weber patent and has since been trying to get MCI to pay royalties.

"In regards to the 800 patent they are way off base, because we built our own system that is totally different than AT&T's," said Jim Collins, a spokesperson for MCI.

**Mike Moeller**

# We deliver CCITT, CCIR, ETSI, IEC, EIA/TIA, JEDEC and IEEE

We can supply essential technical standards from these and other international organisations.

We can also supply a range of overseas newsletters and market and technology studies for telecommunications professionals covering:

- International Services Digital Network

- Synchronous Digital Hierarchy
- Asynchronous Transfer Mode
- Virtual Private Networks
- International Resale
- Digital Video Compression
- Virtual Reality
- Fibre Distributed Data Interface
- Fibre to the Home

We offer a personal service backed up by industry and technical expertise.

Call Sally Lloyd  
on (02) 555 7377.  
Fax (02) 818 2294.



**STUART CORNER  
INFORMATION SERVICES**

**New Zealand****TCNZ Restructures**

Telecom Corporation of New Zealand (TCNZ) is soon to undergo its most dramatic shake-up since it was corporatised six years ago after splitting from the NZ Post Office. The changes will flatten Telecom New Zealand's management, unravel its regional structure and further reduce its workforce.

The restructure is the result of the workings of a management task force which spent the past year examining the corporation's operations. Initially, it was expected to take place in September last year. But the arrival of new Managing Director, Dr Rod Dean, from the state-owned Electricity Corporation of New Zealand put those plans on hold.

Currently, TCNZ has four regional operating companies (Rocs) and a central corporate office. In addition, there are three other business units: Telecom Network Operations, which manages the national network; Telecom New Zealand International, which handles external services; and Telecom New Ventures, which oversees a number of other business units including Telecom Cellular.

After the restructure, TCNZ will be organised into functional divisions. They are: Business Sales and Service, Residential Sales and Service Marketing, Fundamental Planning, Deployment Planning and Core Design, Network Design and Build, Network Operations, Information Systems, Billing and Logistics. All these divisions will report to Chief Operating Officer Ben McMillan who in turn reports to Dr Dean.

International Operations and New Ventures are likely to remain intact, though with some changes. Both divisions will report to Director New Ventures and International, Jeff Carter. Telecom Auckland Managing Director, Peter Blades, will manage Business Sales and Service. Telecom Wellington Managing Director, Don Vangilder, will head Residential Sales and Service and Tom Potrykus will continue to head Marketing in the new structure.

Telecom New Zealand has widely hinted for some time it intends to drop the regional structure as part of a wider series of cost-cutting measures. The regional structure was originally put in place before TCNZ was sold. Some observers thought at the time, that regional company structure might have been put in place to enable a piecemeal privatisation with great competence.

Whatever the original intention, the regional structure has not always been a huge success. For example, two years ago Telecom's Telecom Equipment Supplies subsidiary complained that there was little equipment standardisation between the Rocs.

Staffing details are sketchy, but the Communications and Energy Workers Union is braced for as many as 2,000 job losses.

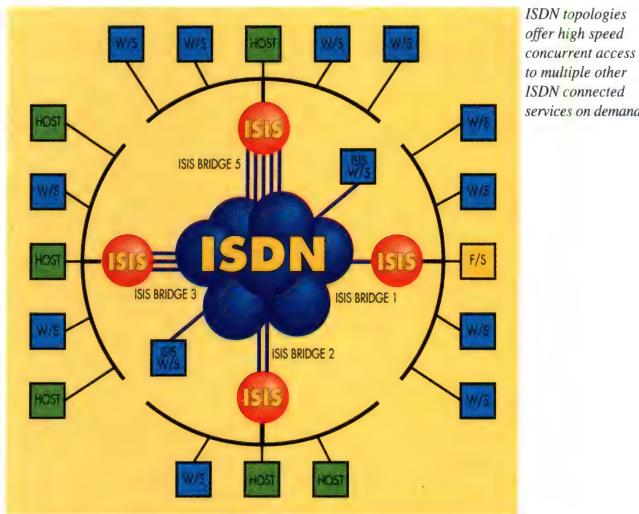
**Bill Bennett**

# ISDN Technology Update

## Merging ISDN with LAN Technologies

### Essential Features: ISDN Access Servers

- Integrated system. Modular and scalable from 1 to 5 Microlinks.
- On-demand concurrent multipoint and point-to-point call profiles.
- On-demand channel aggregation from 64Kbps to 640Kbps.
- On-demand automatic call setup and knock-down with tenacity.
- MAC layer bridging and protocol sensitive link management.
- Call profile security with dial back and CLIP triggers.
- Remote and local management with built-in protocol analyser.
- Protocol transparent with broadcast and source address filtering.
- Call tenacity, auto call maintenance and ISDN fault recovery.
- Workstation drivers compatible with NDIS, IPX, etc.
- Low cost (<\$3k workstation, <\$6k Bridge 1 System.)
- Austel approved for connection to Microlink.



### ISDN's promise of high speed digital connections between workgroups is now delivered.

- Around the world or just around the city, the ISIS LAN Access Server family offers reliable, manageable and cost effective LAN to LAN and workstation to LAN access at speeds ranging from 64Kbps to 640Kbps, on demand!
- Designed from the top down to provide integrated and expandable pure digital connections at the MAC layer, ISIS also includes built-in security and management.
- The **ISIS LAN Access Bridge** is ideally suited for WAN and backbone router integration, remote site access, E-mail and mainframe access over LAN protocols such as IPX, IP, OSI CLNS, DECNet, Vines, XNS, etc.
- The **ISIS Workstation** provides the ideal platform for single station remote access to other peers and LAN systems in a telecommuting environment.
- For further information on ISIS LAN Systems, simply copy your business card onto this page and fax it to Network Designers Asia Pacific Group Headquarters.

**NETWORK DESIGNERS** **kn-X**

Network Designers kn-X Advanced Systems Group.  
Level 9, 22 Williams Street, Melbourne, VIC 3000, Australia.  
Phone (03) 629 3800. Facsimile (03) 629 5791.

Reseller, System Integrator and Dealer enquiries are welcome.

# HP LanProbe II brings a new level of insight to HP OpenView.



*HP LanProbe II can be managed from either an HP-UX OpenView workstation or a Microsoft® Windows™ PC.*

## Use HP LanProbe II with the HP OpenView Probe Manager, and manage faults more effectively.

HP LanProbe II is a second-generation Ethernet LAN monitor that spots and diagnoses network problems quickly. Using HP's newest OpenView application, HP Probe Manager, you can access the power of HP LanProbe II from an OpenView HP-UX workstation and get the most comprehensive network management from a single source.

HP LanProbe II supports RMON-MIB\*, the accepted standard for SNMP network monitoring. So you can monitor all the nodes on your network - even if they come from

different vendors - using the largest variety of management tools.

These tools include current statistics for fault management, and long-term trend graphing for performance tuning and network planning. Plus, you get remote packet capture and decoding for protocols such as TCP/IP, Novell, NetWare, Banyan VINES, DECnet, AppleTalk, OSI, 3COM, and XNS to help you locate problems fast and take corrective action directly.

And since HP LanProbe II complies with RMON MIB and other industry standards, your investment in probes and applications is protected. So, if you'd like more insight into the performance of your network, call

our customer information centre on 008 033 821 or Melbourne 272 2555 and we'll send you a data sheet that explains how HP LanProbe II helps you take network management to a new level.

\*Remote Network Monitoring Management Information Base. All registered and unregistered trademarks mentioned above are the sole property of their respective companies.

**A Better Way.**

 **HEWLETT  
PACKARD**

# Ethernet Gears Up For 100Mbps

Several proposals to bring inexpensive, easy-to-install 'fast Ethernet' to the desktop are jockeying for IEEE approval.

The short list of high-bandwidth networking technologies is likely to gain a major addition in the next year, now that the IEEE 802.3 committee has begun work on a new standard to bring 100Mbps speeds to Ethernet LANs. Once approved, the IEEE's 'fast Ethernet' standard should deliver something that existing technologies like FDDI, CDDI, and ATM can't match: An inexpensive and relatively easy way to bring high speeds to corporate desktops.

The key to fast Ethernet's success is its use of widely-installed existing copper wiring and Ethernet packet technology. The IEEE 802.3 committee wants fast Ethernet to run over ordinary voice-grade unshielded twisted-pair (UTP) copper wiring, enabling users to take advantage of its 100Mbps speeds without rewiring their networks. This will not only help users make more efficient use of high performance workstations and printers but should also pave the way for the widespread introduction of new multimedia applications.

But several issues must still be resolved for fast Ethernet to become a reality. The biggest concern is finding a way to meet tough US and often even tougher international restrictions on the amount of electromagnetic radiation emitted by voice-grade (Category 3) UTP wires carrying high speed traffic. Right now, vendors are sharply divided on how to solve the radiation problem, as well as on fast Ethernet implementation questions in general.

The time it takes to resolve these issues is also a concern. The IEEE 802.3 committee is expected to consider at least four different proposals for fast Ethernet. The hearing process will probably delay publication of a draft standard until October at the earliest. Some vendors are worried that any delay in approving a fast Ethernet standard will imperil fast Ethernet's chances to compete with other emerging technologies, particularly asynchronous transfer mode.

Differences notwithstanding, the competing vendors agree on three crucial implementation points:

- Fast Ethernet should be based on the same star topology used in 10Base-T networks, with workstations connected at distances of up to 100 metres from a central hub.
- Fast Ethernet should use the same packet format as 10Mbps Ethernet, so that existing Ethernets can link to new 100Mbps networks via simple, inexpensive hubs equipped with memory buffers to handle speed differences. This means no expensive routing or repacketising functionality will be required to link old and new networks.
- By limiting distances to 100 metres, fast Ethernet cannot be used as a backbone technology. That role will fall to FDDI or ATM.

Redesigning Ethernet's 10Mbps drivers to run at 100Mbps won't be difficult or expensive, vendors say. The challenge is to find a

way to transmit data at 100Mbps over voice-grade unshielded twisted-pair without exceeding electromagnetic radiation limits defined by the US Federal Communications Commission (FCC).

This critical issue has split vendors into two camps. One group contends that 100-Mbps Ethernet can meet FCC regulations at an affordable price only by spreading the data signal over four UTP wire pairs instead of two and by limiting transmissions to one direction at a time.

The first change is not difficult to accomplish; although 10Mbps Ethernet uses only two wire pairs, much existing unshielded twisted-pair cabling typically includes four wire pairs, two of which now remain unused.

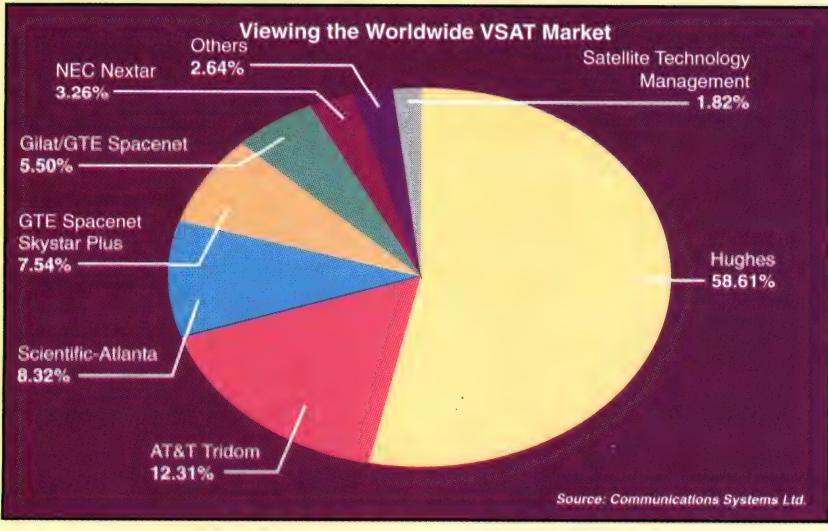
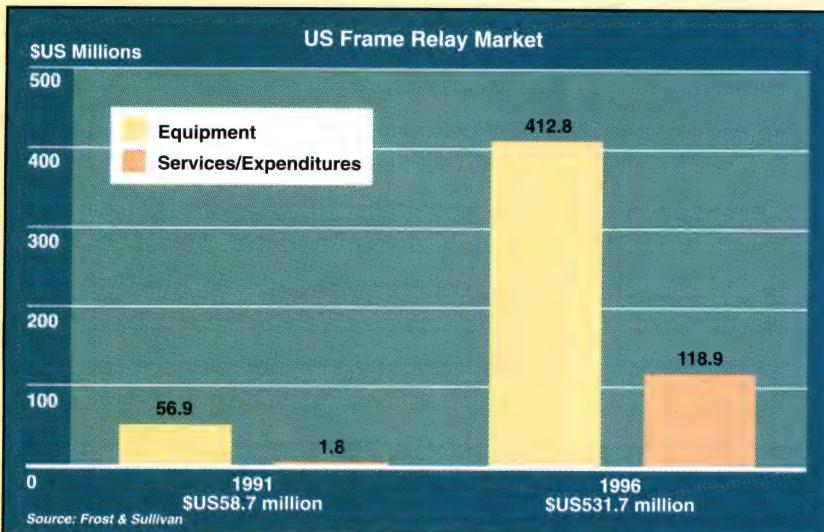
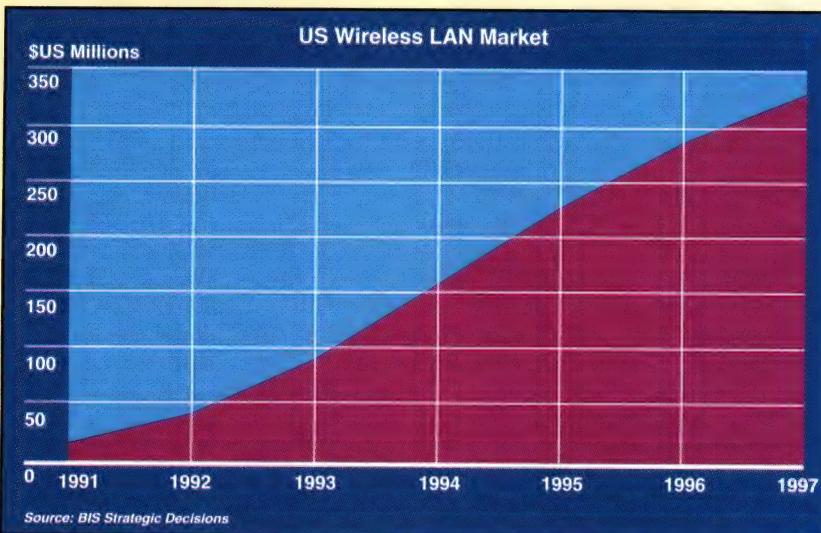
But limiting transmissions to one direction would require replacing Ethernet's existing CSMA/CD (carrier-sense multiple access with collision detection) media access control (MAC) protocol with a new network access method. With CSMA/CD, workstations must be able to receive and transmit data simultaneously, to sense when the network is busy. A second group of vendors argues that Ethernet without CSMA/CD isn't Ethernet at all, and that radiation restrictions should be met by using silicon-based signalling techniques rather than replacing Ethernet's MAC protocol.

The move to replace CSMA/CD is being led by two formidable vendors: AT&T Microelectronics and Hewlett-Packard. At a

## Divided Loyalties for Fast Ethernet Options

| VENDOR                   | PROPOSAL SUPPORTED | NETWORK ACCESS METHOD USED             | WIRE PAIRS REQUIRED | UTP CATEGORIES SUPPORTED |
|--------------------------|--------------------|--|---------------------|--------------------------|
| AT&T Microelectronics    | 100Base-VG         | Demand Priority Protocol               | 4                   | 3, 4, 5                  |
| Cabletron Systems        | FDE (20Mbps only)  | CSMA/CD with disabled collision detect | 2                   | 3, 4, 5                  |
| Grand Junction Networks  | 100Base-X          | CSMA/CD                                | 2                   | 5                        |
| Hewlett-Packard          | 100Base-VG         | Demand Priority Protocol               | 4                   | 3, 4, 5                  |
| Intel                    | Undecided          | CSMA/CD                                | Undecided           | Undecided                |
| LAN Media                | LMC                | CSMA/CD                                | 2                   | 3 (low-noise only), 4, 5 |
| Microaccess              | Undecided          | CSMA/CD                                | 4                   | 3, 4, 5                  |
| Sun Microsystems         | Undecided          | CSMA/CD                                | Undecided           | Undecided                |
| SynOptics Communications | Undecided          | CSMA/CD                                | Undecided           | 3, 4, 5                  |
| 3Com                     | Undecided          | CSMA/CD                                | Undecided           | 3, 4, 5                  |
| Ungermann-Bass           | Undecided          | CSMA/CD                                | Undecided           | 3, 4, 5                  |

## Market Watch



November meeting of the IEEE 802.3 committee, the two jointly submitted their proposal for fast Ethernet, called 100Base-VG (for 'voice grade').

Under the 100Base-VG group proposal, 100Mbps signals are transmitted over four wire pairs in a single direction — either from the hub to the workstation, or from the workstation to the hub. The proposal replaces CSMA/CD with a new access method, called Demand Priority Protocol. With this protocol, access requests from workstations are forwarded to the hub, which answers each request in turn.

Splitting the 100Mbps signal over four wire pairs brings radiation levels almost to within FCC regulations, according to AT&T Microelectronics and Hewlett-Packard. To complete the job, the vendors have devised a new encoding scheme called 5B6B to replace the Manchester encoding scheme used in 10Base-T Ethernet.

100Base-VG's key advantage is that it will be cheap to implement, say its proponents. "It doesn't use any new or earth-shattering technology," says Juan Figueroa, high speed LAN Marketing Manager at AT&T Microelectronics. HP claims that 100Base-VG can be implemented for about \$US400 per node, including the cost of the hub and workstation adaptor. The 100Base-VG proposal has the support of a number of leading hardware and software vendors, including Microsoft, Apple Computer, Cisco Systems and Novell.

The 100Base-VG proposal holds another key advantage over CSMA/CD: It is able to handle time-sensitive traffic, which means it can accommodate voice, video, and multimedia applications.

"Customers told us that just speeding up the data rate wouldn't be enough if they had to change the network again later on to incorporate multimedia," says Brice Clark, Strategic Planning Manager at HP's Networks Division.

With 100Base-VG, workstation adaptors mark time-sensitive packets with a 'priority' bit. Hubs examine the packets for these bits and handle marked packets before ordinary data packets to speed their transmission over the network. CSMA/CD does not offer any way to prioritise traffic. The only way for CSMA/CD networks to handle time-sensitive packets is through the brute-force approach used by network hardware vendors like Alantec and Kalpana. These vendors use Ethernet switches to connect equipment over dedicated 10Mbps lines. Most market watchers expect prices for such switches to fall and become competitive with fast Ethernet offerings.

### But is it Ethernet?

The 100Base-VG group proposal to remove CSMA/CD from fast Ethernet has already run into stiff opposition from other vendors

## Network Management

### Extending SNMP to the Desktop

Desktop management systems are finally on their way to becoming full-fledged members of the network management community. Until now, almost all of these systems have been proprietary, preventing the information they gather from being used by centralised SNMP or CMIP-based network management systems.

Now it appears that the tasks desktop management systems perform — such as inventory polling, configuration, software distribution, and troubleshooting — will be available to standards-based management systems. Two separate groups are developing standard access methods to link desktop management systems to net management systems. At the same time, vendors are enhancing their desktop management products, enabling them to report to standard net management stations.

An industry consortium called the Desktop Management Task Force (DMTF) and the Internet Engineering Task Force (IETF) are working separately to manage all components of desktop computing — including

hardware, operating systems, applications, storage, and peripherals — from standard SNMP stations. Products that use these technologies should appear this year.

Meanwhile, four prominent networking vendors have announced desktop management systems with links to management systems based on SNMP or the OSI-based common management information protocol (CMIP). Two of these systems are available now — LANLord from Microcom and the Netware Management System (NMS) from Novell — while Intel was scheduled to ship its LANdesk system by last month. The fourth vendor, IBM, says that it will ship LANfocus Management/2 in the second quarter of this year.

By consolidating and integrating desktop management applications and network management systems, vendors hope to address users' two biggest complaints about existing desktop management systems: that they don't work with one another and their access to standards-based, centralised network management systems is limited.

The current crop of desktop management products relies on proprietary techniques to obtain information from workstations. However, an inherent design limitation of DOS and Windows precludes personal computers from being managed like other network devices: Most PCs running DOS and Win-

dows don't have enough random access memory to comfortably support SNMP software components such as the TCP/IP protocol stack or extra code needed to support multiple agents.

To compensate, vendors of desktop management systems currently rely on proprietary software agents to manage PCs. These agents can be located on network interface cards installed in the PC or in applications on the computer itself.

Only a handful of desktop management systems support standard protocols today (see table). Even these products are bound by another constraint: They translate information only from their proprietary desktop management applications into SNMP or CMIP format. Other vendors' types of management applications can't use these translation utilities, or so-called proxy agents.

Because they're not integrated, different vendors' desktop management applications usually can't run simultaneously. It's not possible to combine data from one vendor's software distribution package, say, with that of another vendor's inventory package.

The efforts of the DMTF and IETF, combined with emerging desktop management systems, could bring relief from these restrictions. For users, the relief can't come too soon. "We've told vendors of desktop management products that we want to integrate them all under a single user interface to make the most of our resources," says Kenneth Dick, Director of MIS at First Data Corporation in the US. His group uses three desktop management packages: The SNMP-based LANLord; Novell's Netware Management System (NMS), which also supports SNMP; and a beta version of IBM's LANfocus Management/2 system.

### Projects with Promise

The Desktop Management Task Force is a consortium of eight vendors: Digital Equipment Corporation, Hewlett-Packard, IBM, Intel, Microsoft, Novell, Sunconnect and SynOptics Communications.

These eight vendors are footing the bill for the development of a set of APIs called the Desktop Management Interface (DMI) that will allow different vendors' desktop management applications to share common memory space on a personal computer and to communicate with any type of management system — including those based on SNMP and CMIP.

Approximately 70 other companies, including Apple Computer, are working with the Desktop Management Task Force to construct the DMI. But these others aren't paying for the development of the DMI, and they must be sponsored by one of the core members in order to participate.

When it's completed this year, the DMI will comprise software for PCs running under DOS or Windows; written specifications; and a conformance test application, also for DOS or Windows — that will test

### Selected SNMP Desktop Management Systems

| VENDOR            | PRODUCT   | DESCRIPTION  |
|-------------------|---|--|
| Apple Computer    | Macintosh SNMP Manager (part of AppleTalk Connection and TCP/IP Connection) | Integral part of Macintosh OS: Works with three SNMP agents assigned to monitor communications, software, and hardware                 |
| Cabletron Systems | Ethernet SNMP for Cabletron DNI Series                                      | SNMP agent for Cabletron or 3Com Ethernet adaptor cards  |
| IBM               | LANfocus Management/2   | Supports native SNMP and CMIP to manage desktop systems running under Microsoft Windows, DOS, OS/2, or NetWare                         |
| Intel             | SNMP Services   | SNMP proxy agent, implemented as NLM   |
|                   | LANdesk Series  | TSR for DOS, DLL for Windows, and NLM for NetWare; supports multiple applications, including LANdesk Gateway/SNMP, an SNMP proxy agent |
| Microcom          | LANLord   | DOS or Windows workstation agents, OS/2 server agent, and management interface for Windows   |
| Novell            | NetWare Management System with NetWare Services Manager                     | SNMP agents for NetWare servers, implemented as NLMs; Windows user interface   |
| Racal-Datacom     | Roll-Call 2.0   | SNMP management applications for DOS or Windows, with SNMP agent for Ethernet adaptors that support NetWare                            |
| 3Com              | Linkwatch   | SNMP agent for 3Com Ethernet adaptors; includes Windows-based user interface   |

CMIP = Common Management Information Protocol  
CMOL = CMIP over Logical Link Control  
DLL = Dynamic Link Library  
NDIS = Network Device Interface Specification

NLM = NetWare Loadable Module  
ODI = Open Data Link Interface  
TSR = Terminate and Stay Resident

how closely applications implement the DMI interfaces.

The DMI software will be offered as terminate-and-stay resident (TSR) applications for DOS or Dynamic Link Library (DLL) applications for Windows. As a result, the software consumes RAM only when activated. Once activated, the DMI software creates a space in RAM in which to run any application that deploys the DMI APIs. For example, different vendors' packages for inventory, virus protection, and hardware configuration will all use the common DMI memory space (albeit at different times). Vendors of desktop management applications will have to enhance their software to support the DMI, but most say this will not be a problem.

The DMI software will also link desktop computers to standard network management stations. One element of DMI, the component interface, translates ASCII text information from management agents loaded in the workstation's software, hardware, peripherals, and operating system. The DMI software will convert this information into a common format, called the DMI management interface, that can then be converted for use by network management stations using SNMP, CMIP or other protocols.

That's where the work of the IETF's task force comes into play. The task force, chaired by Steven Waldbusser of Carnegie-Mellon University at Pittsburgh, has created an SNMP host resources management information base (MIB) that describes the general components of any type of computer system, from PC to mainframe, to a net management station. Thus, the host resources MIB provides a way for DMI-compliant desktop

management applications to communicate with standard SNMP systems.

The host resources MIB does not provide a direct link to the DMI; rather, the APIs in the DMI will use the host resources MIB as the common language between SNMP management stations and proxy agents assigned to collect information from DMI-compatible applications.

This is not to say that the DMI can only use the host resources MIB. The DMTF is writing the DMI's APIs to be general enough to translate into other formats like CMIP or remote procedure calls (RPCs). And the IETF's host resources MIB isn't dedicated to use with the DMI APIs. Like any MIB, it can be adapted for use on any machine that supports SNMP. Thus, the host resources MIB promises to make a slew of management applications possible for Unix workstations and mainframes.

All DMTF members say they will support the DMI, but the specifics remain sketchy. IBM and Intel say they will add DMTF support in the form of applications that run on their desktop management platforms, for instance, but they don't say when. Meanwhile, Microsoft says it may add DMI support directly to its Windows NT operating system, slated to ship in early to mid-1993. And other members of the DMTF — including DEC, Hewlett-Packard, Sunconnect, and SynOptics — haven't yet developed plans to link DMI applications to their Unix-based SNMP management systems.

## Current Solutions

Because the DMTF and IETF are working to create broadly adaptable applications, it shouldn't be a problem to fit both the DMI

and host resources MIB into the architectures used in existing desktop management products.

Vendors of adaptor card solutions monitor a PC through drivers in network interface cards. Some products, like those from Cabletron and 3Com, use agents located directly on their Ethernet cards or those of other vendors; offerings from Racal-Datocom and Syskonnect in contrast, take input from other vendors' cards.

Desktop management applications based on adaptor card agents offer the advantage of a direct link to SNMP or CMIP network management systems. They also provide insight into the activities of a workstation on the LAN. But because these applications rely on the network interface card for their information about the PC, they aren't always able to get as much detail about the internal workings of a computer. For that, software-only agents (which tap directly into a computer's operating system) are needed.

These products make more extensive use of personal computer resources than adaptor-based agents. New Products like Intel's LANDesk Series use TSRs for DOS, DLLs for Windows, or Netware Loadable Modules (NLMs) for Netware servers to obtain information nonintrusively, while a PC is running other applications.

Other vendors of software-only products, including Network Edge, believe users don't like TSRs, so they offer standard DOS and Windows applications that take information from the server or workstation during startup or at another prearranged time. This information is stored on the LAN server for subsequent display and use.

**Mary Jander**

## Fast Ethernet from page 28

participating in the IEEE 802.3 committee. Grand Junction Networks, Intel, LAN Media, SynOptics Communications, 3Com and Ungermann-Bass are among the vendors who have come out in favour of retaining CSMA/CD (see table on page 27).

Arguments against discarding CSMA/CD fall into three categories. The first, and most important, is that replacing CSMA/CD will cause a potentially harmful delay in the development of the fast Ethernet standard. For fast Ethernet to succeed, some vendors argue, the standard must be developed swiftly to ward off the anticipated arrival of more affordable products based on 155Mbps ATM technology. "Opening up the MAC will add six months to the development cycle," asserts Mike Richmond, Strategic Marketing Manager for Intel. Richmond says any change to the MAC protocol would have to be deliberated at length by the IEEE 802.3 committee. "By that time, the standard would be irrelevant," he contends.

A second argument against 100Base-VG involves existing network management sys-

tems. "By keeping CSMA/CD, SNMP network management platforms optimised to record Ethernet statistics such as collisions can continue to operate in the same way," says Larry Birenbaum, Vice President of engineering at Grand Junction. A new management information base (MIB) will have to be developed if CSMA/CD is replaced, he says.

Opponents of 100Base-VG also contest claims that 100Base-VG products will be inexpensive. Critics say that dual-speed cards (supporting both 10 and 100mbps) would probably be prohibitively expensive to produce, since they would have to accommodate both CSMA/CD and the Demand Priority Protocol. They argue that while CSMA/CD hubs simply broadcast packets to all nodes, 100Base-VG hubs use a routing technique that will make the hubs much more expensive to produce.

AT&T Microelectronics and HP counter that the 100Base-VG routing process is simple, and that any additional hub costs will be offset by lower costs for network adaptors, since the cards won't have to handle the collision detection functions required by CSMA/CD.

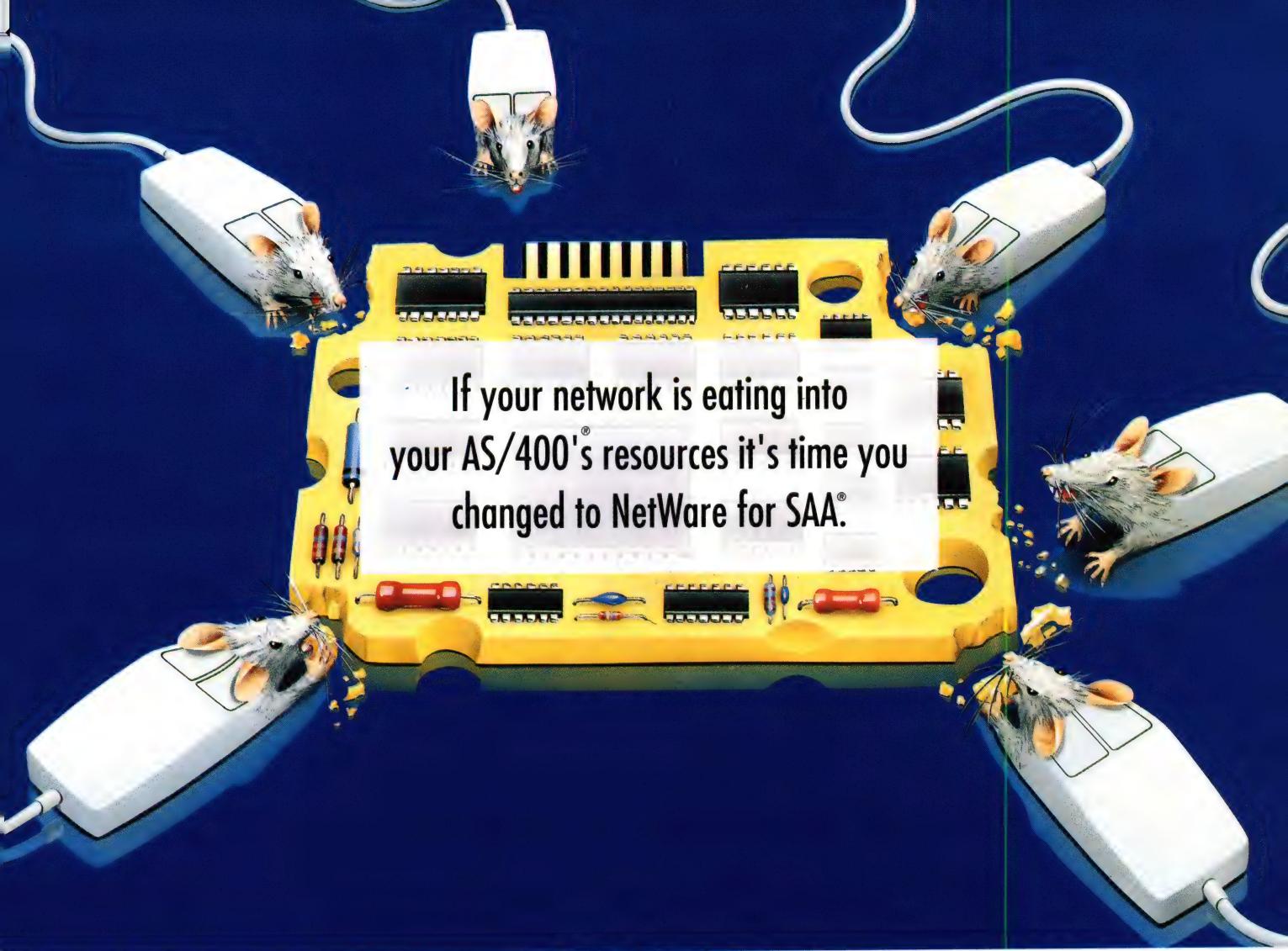
## Counter Proposals

100Base-VG is only one of four technical proposals for fast Ethernet being put to the IEEE 802.3. Grand Junction and LAN Media were scheduled to submit separate proposals at a meeting of the IEEE's fast Ethernet committee early this year.

The two new proposals have much in common: They both call for the retention of CSMA/CD, they both run signals over two wire pairs instead of four, they both incorporate the 10Base-T star topology, and they both retain the existing Ethernet packet format. The difference between the two lies in their proposed signalling methods for dealing with radiation.

The proposal from Grand Junction, called 100Base-X, recommends using signalling techniques already developed by ANSI for its new FDDI-over-copper standard.

"We don't see any point in reinventing the wheel on signalling when ANSI already has a solution," says Jack Moses, Vice President of Grand Junction. By making use of the work ANSI's X3T9.5 TP-PMD committee has already done on signalling, a fast



If you're running an AS/400 network, there's a good chance that it's eating up too much of your AS/400 and PC resources.

Novell's NetWare for SAA software provides NetWare users with flexible, comprehensive IBM mainframe and AS/400 host connectivity while maximising network performance, security and administration.

Unlike other connectivity options, NetWare for SAA only requires the communications server to be known to the AS/400, so the network is much less resource hungry. To improve efficiency, NetWare for SAA allows dynamic loading, unloading and reconfiguration of services without bringing down the

server or affecting other services. NetWare for SAA can also provide you with a full audit of each PC's connection status - allowing more effective network analysis and troubleshooting.

NetWare for SAA is backed by the extensive resources of Com Tech - Australia's leading Open Systems distributor. Com Tech's depth of expertise in network installations is evidenced by the fact that half our staff are dedicated to technical service and support.

So if you want to improve the productivity and efficiency of your AS/400 network, change to NetWare for SAA.

For details of your nearest authorised reseller please phone Com Tech on:

NSW (02) 317 3088 or (008) 263 954, VIC (03) 696 0770, ACT (06) 257 7695, QLD (07) 832 2699, SA (08) 271 8600, WA (09) 322 5605.

Please rush me more information on  
Novell NetWare for SAA

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Post Code \_\_\_\_\_

Send to: Com Tech Communications,  
PO Box 207, Alexandria, NSW 2015 or  
Fax to (02) 317 3339.

**NetWare for SAA®**  
Extending your resources.

**NOVELL**®

All products referred to by their trade names are protected under the provision of relevant trade marks and patent legislation and accordingly none of the products or the names may be copied in any way without the prior consent of the proprietor. All registered or unregistered trade marks referred to are the property of their owners.

CT3040 Smith Ross & Muir

PRINT POST APPROVED PP25500300250

**COM  
TECH**

Ethernet standard could then be ratified very quickly, he says.

ANSI's approach uses two techniques implemented in silicon to reduce radiation emissions over two twisted pairs: A line encoding scheme called MLT-3, and a scrambling methodology known as 11-bit Stream Cipher. The ANSI scheme only works over data-grade (Category 5) UTP, which means it could not make use of the huge installed base of Category 3 voice-grade cable.

The LAN Media proposal, tentatively called LMC, calls for using a new signalling scheme. Like ANSI's MLT-3, the scheme increases throughput partly by using three voltages, to represent values of 0, +1, and -1, instead of the two voltages (for 0 and 1) used in 10Mbps Ethernets. However, LAN Media claims its new scheme can operate at 100-Mbps over Category 4 and 5 cable, along with some types of low-noise Category 3 cable, claims Ron Crane, President of LAN Media.

Whether the industry will accept a proposal that requires it to redefine performance parameters for voice-grade cables remains to be seen. Nevertheless, Crane says he expects SynOptics, Sun Microsystems and 3Com to support the LMC proposal.

Part of the economic argument made by supporters of the 100Base-VG proposal is that silicon-based signaling techniques like

MLT-3 will make fast Ethernet unaffordable. As evidence, they point to the high price of the first new FDDI-over-copper cards implementing MLT-3.

Grand Junction counters that fast Ethernet cards incorporating MLT-3 will be much less expensive than FDDI-over-copper cards featuring MLT-3 for two reasons. They won't have to implement the complex station management (SMT) network management facilities as defined in FDDI, and Ethernet technology is inherently simpler to implement than ring technologies like FDDI and Token Ring.

"Silicon prices depend on the volume of products shipping," says Richmond of Intel. "If fast Ethernet takes off, this technology will not be prohibitively expensive." Like AT&T Microelectronics and Hewlett-Packard, Grand Junction and LAN Media claim products based on their proposals can be sold for about twice the price of existing 10Mbps Ethernet products.

### Shipping Now

In addition to proposals for 100Mbps Ethernet, Cabletron Systems has come forward with a proposal to boost the speed of Ethernet to 20Mbps. Called Full Duplex Ethernet (FDE), it is intended to coexist with the eventual 100Mbps fast Ethernet standard.

Full Duplex Ethernet works by disabling the 'collision detect' part of CSMA/CD. This disabling enables 10Mbps of data to be passed in each direction between the network hub and the workstation, yielding a total throughput of 20Mbps.

With all the activity in the IEEE 802.3 committee, it's easy to overlook the fact that one vendor is already shipping what it calls a fast Ethernet product, albeit a proprietary version. US company Microaccess claims it has installed 2,000 100Mbps nodes using its OptiLAN range of products.

Under the Microaccess approach, data is transmitted at 100Mbps using a proprietary differential code modulation (DCM) signalling technique. OptiLAN is a bit of a patchwork solution clearly intended for users willing to pay extra for more speed now. It requires six copper pairs to transmit data, and users must install OptiLAN cards with two UTP cables to get six pairs.

The vendor says a four-pair version will be available soon. Another drawback is that OptiLAN uses 4500-byte packets, making it incompatible with the 1,500-byte packets used in standard Ethernets. The vendor says it is working with a bridge vendor to produce a device that will convert packet sizes to solve this problem.

**Stephen Saunders**

# 3Com's new hub is also a hub, a

It used to be that a hub was a hub. But now there's a hub that will grow and change with you. In more ways than ever.

Introducing the new LinkBuilder® Flexible Media Stack hub family. The most cost-effective alternative to chassis-based hubs, with the flexibility to meet the demands of your network now and years from now.

Every hub in the LinkBuilder FMS™ family is stackable. You can add ports, management capability, and different types of media whenever the need arises.

You can start with 12 ports. Then start stacking. You can connect four units in all, and they'll act as a single, logical repeater. Even if each box features different media. Like coax, 10BASE-T, and fiber.\*

Need to add management? Simply buy a single Manage-



## Mobile Communications

## Arena's MCN: Great Technology or Great Marketing?

As every dedicated couch potato can attest, true telecoms competition came visually to Australia in the dying stages of 1992. Not through new technology or lower prices, but in the form of a mind-numbing battle with Tweedleum and Tweedledee vying to present the most obnoxious ads the greatest number of times on television.

We now face the prospect of a year of wall-to-wall mobile telephone ads, with Arena GSM filling the breaks between an appropriately-named Yank called Chuckie, and a promiscuous stream-of-idiots who always say 'Yes.' You'd have thought that, given the on-going Royal Family telephone scandals, 'Chuckie,' sexual innuendoes and mobiles were not an association that these companies would wish to make!

But Arena has an advantage here: It is not just reselling Telecom's MobileNet under a different name, or flogging the stock-standard GSM off the shelf — it has 'product

differentiation' in the form of Micro Cellular Network (MCN) technology.

Arena, which has also promised to create 5,000 jobs says its new 'patented . . . unique Micro Cellular Network technology, will enable people to take advantage of significant discounts on current cellular tariffs, thus making cellular phone usage more affordable for domestic and local business users.' There, you have it. A truly innovative product at last: Cheap GSM on an MCN — courtesy of Vodafone in the UK.

It really is nice to have a new company so modest in its claims — keen to solve our unemployment crisis while saving us money! I'm looking forward to the advertising blitz, where Chuckie discovers that Australians invented MCN along with AMPS, while touring an outback suffering plague infestations of mobile telephone employees. Yes!

### Two Cell Types

But what is this mysterious MCN? How will it fit with the set-in-concrete international GSM standard? And how will it save us money? According to Arena, MCN technology will make mobile calls up to '25% cheaper.' Or is that 50% cheaper? Arena's booklet and publicity blurbs give a couple of different figures. The booklet, for instance, states that 'Arena GSM intends to operate a

localised service at half the current tariff level, as well as a full national service.' Later, in the same booklet it says 'the monthly access fee for MCN will be set at half the national GSM rate.'

Arena's licence begins in July, and it should have networks up and running in Sydney, Melbourne and Canberra by September. It has committed itself to 80% coverage of the population by 1996.

Apparently, customers will be able to choose between subscribing to a national GSM or a MCN service, although Arena's manager, Philip Cornish, says the tariffing details haven't been finalised yet. The major cities will have both 'micro-cells' (up to 4km across) and 'macro-cells,' while the rural areas will have macro-cells only.

"Physically [in the city] you need to overlay smaller cells on the conventional GSM network, and they will feed back to a parent GSM cell by microwave links," explains Cornish. In the city and suburbs there will be a few large macro-cell transmitter sites, each surrounded by a half-dozen micro-cell transmitters operating on different frequencies. Both macro-cells and micro-cells will be servicing the same geographical city area, and both will use standard GSM technology in the same allocated band of spectrum (but at different local frequencies).

# hub, a hub, and a hub.



ment Module to plug into the rear of the bottom unit. The entire stack is now managed.

And to help you craft your network, we'll include a free EtherLink® III Parallel Tasking™ 16-bit adapter board with the purchase of any LinkBuilder FMS hub. EtherLink III boosts performance 25 percent over the leading adapter today.

Call 3Com on **(02) 959-3020, ext. 22** for details and free information on our hub family and the LinkBuilder FMS. And find out just how flexible a hub can be.



\*Fiber available early 1993. ©1992 3Com Corp. (408) 764-5000.  
3Com, LinkBuilder, EtherLink, FMS, and Parallel Tasking are trademarks of 3Com Corp.

"The point is, that each GSM [macro]-cell links back to a Mobile Switching Centre (MSC), while each micro-cell is connected back to the main network — not through the MSC — but through the macro-GSM cell. In effect, [it is this macro-cell which] defines your local area," Cornish says.

A switching centre will attempt to make the connection first through the local micro-cell, and only fall back on the macro-cell if its first attempts fail. However, full hand-off will be available between all cells of the same type, and between macro- and micro-cells.

Since most GSM network plans also have small central-city cells which are likely to be no bigger than Arena's micro-cells, it is hard to see what advantage this overlapping approach gives them. Arena seems to be using the macro-cell transmitter centres as sites for a concentrator which is then shunting the calls, billing and switching information between the micro-cells and the MSC. But it is hard to see this as especially innovative: Standard GSM networks would have clusters of cells of this size dealing with the switching centres direct.

In fact, when you dig below the surface, the MCN technology begins to appear to be only a little more than a software billing system. This billing system is able to apply different rates to the two classes of user, depending on whether he is within his 'home-area' or roaming outside. I put this to Cornish: "Yes. In short-hand, that's quite correct," he said. "I suppose you could say that this was a differentiated billing system — depending on a subscriber's identity — how he behaves, and where he is."

Arena also talks about the importance of 'Service Separation' (between GSM and MCN) and 'Trunk Reservation' which has been invented to control the allocation of channels to either GSM or MCN, but it is hard to see how the customer benefits from separation and the need for trunk reservations, unless priority is being given to a few higher-level 'national users.' However, Cornish assures me that subscribers paying the higher fee don't get any priority in call-establishment: "The only priority involved is purely an engineering and technical issue; there is not a commercial issue for subscrib-

ers," he says. "You won't be any lower on a priority list in getting through just because you are an MCN subscriber," he says.

Arena believes that city-only MCN will appeal to users who make the majority of their calls from within their 'home area' which is defined as one transmission micro-cell (about 2km in radius) and each of the cells adjacent to this. Cornish agreed that this is the equivalent of a macro-cell area. On average this will give home-area coverage of, say, 4-5km in any direction if you are standing under your local micro-cell transmitter. Within this fixed area, local calls will be tariffed "marginally above the corresponding fixed wire cost."

Cornish would not discuss tariffing proposals in detail but agreed that even in local areas, calls would be timed. When MCN users roam they will pay a premium to reach outside this area across a city, and probably further loadings outside the city boundary — at a price which Arena says bluntly, is set at a 'significant premium' above the 'national GSM tariff' rate.

**Stewart Fist**

## Broadcast Facsimile

### Channel 7 First With the Fax

According to the history books, the Scotsmen, Alexander Bain, invented facsimile back in 1848. However it wasn't until the 1930's that the technology became useable in a practical way, and it wasn't until Japanese manufacturers got together in the 1980s to devise universal standards for modulation and for exchanging interconnect data, that fax technology really began to boom.

The idea of using facsimile technology as part of a broadcast system, was similarly invented many years ago, but faded from the scene. Before WWII there were a couple of US newspapers delivered by broadcast fax, and since the war there have been numerous attempts to graft radio and television signals together with facsimile, to create a superior form of Teletex. Matsushita, Sony and Sharp were working on the delivery problems for a number of years in the late 1980s — but they seem to have given up.

The problem was in converting an interactive standard which required the exchange of hand-shaking information (resolution capabilities, data-rates, error-checking, compression protocols available, etc.), to a one-way system that can't provide back-channel information or negotiate protocols. There wouldn't be a problem if the manufacturers were to throw fax machine standards away and start again — everyone knows that if the idea is to succeed, it must be based on using the same machines for receiving information from both radio and wire-line sources.

Further complicating the issue is the fact that one reason for the fax's phenomenal success has been that the original standards allowed for improvements. For instance, the maximum data-rate of the original Group III fax standard was 4.8Kbps, but now 9.6Kbps is standard and 14.4Kbps is coming — and all these machines will fall-back through these different rates if the lines are noisy, right down to 2.4Kbps.

There was also no error correction built into the first fax standards, and the compression systems were fairly basic, using Huffmans and Modified READ only (we now use 'Modified-modified READ,' would you believe!). All of these changes have progressively improved the system, but telephony-fax is still maintaining full backward compatibility with old machines — but only through the negotiation process. This creates problems, because you can't have negotiation on a broadcast system.

The solution to the broadcast problem was obvious, but for a long time it wasn't achievable. A 'black box' needed to be installed between the receiving antenna and the fax machine to mimic the negotiation process, and to buffer the incoming data at the fastest likely data-rate. Since any broadcast system could be expected to be transmitting both relevant and irrelevant material, this box should also be intelligent enough to recognise only those faxes of interest (using an addressable header or a content 'tag') and to then take and store the incoming information in memory until they were delivered to the fax printer.

There was nothing inherently difficult about this technology, but it was only recently that hardware costs have fallen far enough to make broadcast fax financially feasible.

## International Trials

The first product to appear is Faxcast, developed by a small UK company called Data Broadcast Services Ltd. It is promoting a particularly well thought out, and, I would suggest, highly viable product which has the potential to become a new form of media — possibly the first glimpse of future 'electronic newspapers.'

I know! We've heard this all before and we're all cynical. But there's even more to Faxcast than this!

Faxcast has already been trialed by the BBC and IBC in Britain; by PBS, Manhattan Cable and McGraw-Hill in the US; by Can-Com in Canada; by Swiss Teletex; and also by various broadcast groups in Sweden, Portugal, South Africa, and Hong Kong. Dow-Jones, the *New York Times* and McGraw-Hill are all planning to use the system for electronic publishing. In Australia, Channel 7's Data Channel has an exclusive licence, and the system has been on-sold to TVNZ Datacast in New Zealand.

That's a fairly impressive line-up for a new technology that won't even have the black boxes off the production line until this month. Tim Ryan, Managing Director of Channel 7's Data Channel, says that they have placed an initial order for 2,000 boxes, and a continuing order for another 1,000 a month, so they are certainly confident that the idea will succeed. They plan to lease these boxes out to individuals at about \$22 a month, and to closed user-groups on negotiated arrangements. This cost is for the box only; you'll also need to pay the information provider/s direct.

The target market initially, is for user-groups like Travel Agents who constantly

**The Plain Fax**

- With TV transmission, the system uses four scan lines in the vertical blanking interval.
- The effective data-rate is 57.6Kbps.
- An average single-page fax image file takes just under a minute to transmit.
- An average ASCII file, equivalent to one A4 page, takes one second.
- It is possible to transmit up to 64,000 different 'tagged' services.
- Faxcast can address groups of any size down to one individual machine.
- Each Faxcast receiver can be programmed to handle up to 80 different information services, and hold payment tokens for these services.
- Forward Error Correction is used in all transmissions, and image quality is vastly superior to conventional wire-line fax.

need to receive pricing and scheduling updates from airlines, hotel chains, etc. Usually, an airline will send the information over Telecom's Faxstream list service which entails the individual one-to-one transmission of, say, 3,000 identical messages at some considerable cost. Because of these cost restrictions, the airlines often only bother updating the major agents on a daily basis.

Faxcast will broadcast this same information right across Australia in one hit. Channel 7 has its network link up with other stations across the country and they can transmit a single fax message to reach ten thousand or more agents and sub-agents immediately, and at a considerably lower cost. Broadcast signals can also be transmitted to trucks on the road, buses, trains, etc. — the receiver isn't tied to the telephone wires.

**Data Within the VBI**

In the system Channel 7 plans to introduce later this year, the data is carried in the Vertical Blanking Interval (VBI) of a standard TV signal. The VBI is the unused time-slot while the scanning electronic beam retraces its steps after scanning a picture: You see it as a black-bar at the top of each picture. Part of this time can be used to send data, and this data can be addressed to individuals, small or large groups — or even provided globally to anyone with the right rented equipment.

What is interesting about Faxcast's idea, is that they haven't just solved the broadcast fax delivery problem, but they've taken the opportunity to add a number of special features which expand the capability of the system dramatically. This is data-radio as well as broadcast fax; and Faxcast also has important

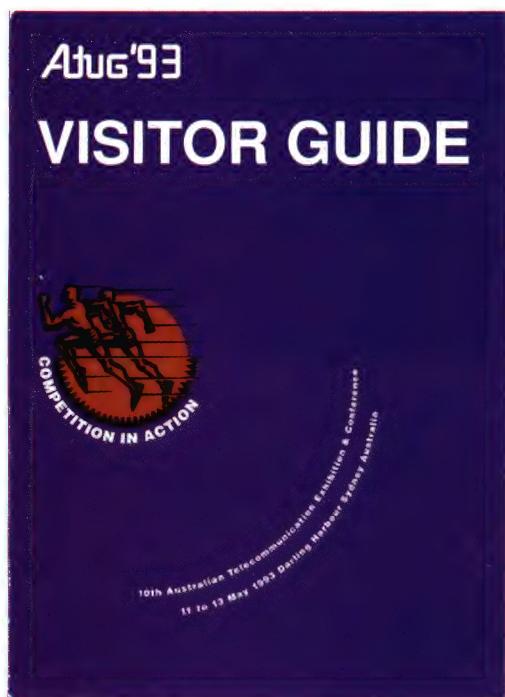
hybrid functions that allow ASCII files to be broadcast to the boxes and for the fax machine to provide an image print-out (after a conversion process) — and this has important cost and bandwidth implications.

The information supplier can send data to the main transmission centre in the form of straight ASCII text, facsimile image files, or in a desktop-publishing format, and he can specify that it be transmitted as ASCII or image files. The receiving box will identify and handle both types of files, and it can output the information through a RS-232 serial port to a PC or laser printer, or to the standard fax machine.

What's more, the box can automatically convert ASCII text files to fax image format (it has one inbuilt font) if the installation procedures have specified this. ASCII files are roughly 20 times more 'efficient' for transmitting text than are image files, so with this facility built-in to every box, it is relatively quick and easy to send out masses of text and still have it printed by a standard fax machine, or taken as ASCII files into a PC or laser printer — as required. It is a very clever feature to include, because it provides the best of both worlds, and once installed, it can be relatively transparent to the user.

*Continued on page 42*

# 12,000 COMMUNICATIONS BUYERS HELD CAPTIVE!



Over 12,000 people are expected to visit the annual communications expo

## ATUG'93

(11th-13th May 1993 - Darling Harbour, Sydney)

These people represent the key communications professionals responsible for purchasing much of Australia's communications equipment and services.

Handed to each visitor on entry to the exhibition is the official ATUG'93 Visitor Guide. Filled with exhibitor details, floor plans, conference schedules, a product index and supporting editorial, the Visitor Guide will be the major reference source during and after ATUG'93.

Advertising bookings for this publication can be made by contacting Craig Burkhill on (02) 264 2200.

Published by Ostasun Pty Ltd, Level 4, 541 Kent Street, Sydney NSW 2000.  
Publishers of Australian Communications Magazine



Melfyn Lloyd

## Resource Discovery on Global Networks

In a networked world, everyone will need to use Resource Discovery Tools. At a time when carrier bandwidth is expanding through ISDN, optical fibre, satellite and radio links, and concurrently, a proliferation of networks and on-line services is taking place, we run up against a fresh constraint: Our capacity (or incapacity) for discovering and retrieving resources on a global scale. In the absence of appropriate discovery tools, the user experience of a global network would be akin to entering a black hole, with potential for time waste if not outright frustration.

The urgency of this issue was amplified following the new Clinton Administration's proclamation on information services as a national strategic weapon. Al Gore, the new US Vice President, has been directly involved with the US National Research and Education Network (NREN) initiative — the creation of 'data super-highways' to form the electronic global village. The creation of such infrastructure and connectivity brings an additional problem of knowing what is out there on the network, and how to make use of it. Gore refers to the problem of having 'all these silos filled with rotting data.'

The existing networks have been likened to the US dirt road system at the start of the century — only courageous and experienced travellers could navigate, making slow and

difficult journeys. We need an infrastructure for networks and the resources they support, capable of answering the basic user queries:

- How do you find out that a resource exists?
- How do you find out more information about a resource?
- How do you find where the resource is stored?
- How do you retrieve or make use of the resource?

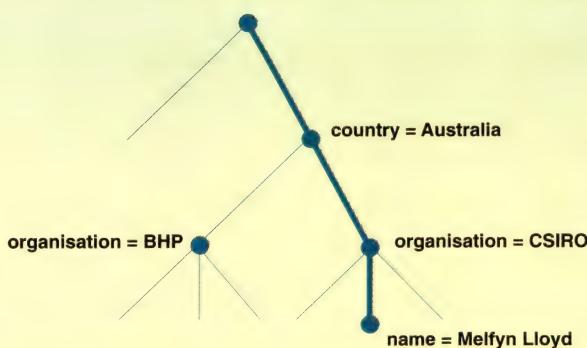
Some tools and techniques exist. Unfortunately, they tend to be ad hoc solutions for specific problems, often useable only by the knowledgeable, and only generally available to the computer research community. Where information and services are organised logically and consistently, location and retrieval can be relatively simple — but this assumption does not hold across networks. Here, we need programs (or agents) that will seek out information based upon imprecisely defined criteria given by the user. Such tools are partial reality today for the cognoscenti user on Internet; the challenge is to make them useable for business and non-experts.

### Existing Tools

Unfortunately, existing resource discovery tools are largely incomplete and somewhat inaccessible. They include:

#### Searching in X.500

Searching the subtree under Australia for 'Melfyn Lloyd' would require the Directory Service Agent (DSA) for BHP and all other DSAs to be accessed until the CSIRO DSA returned success.



Melfyn Lloyd is the Program Manager of the Open Systems Program for the CSIRO's Division of Information Technology. The Division's Open Systems Program plays a leading role in Australia in the design, development and standardisation of open and distributed systems such as electronic mail (X.400), electronic directories (X.500) and Open Distributed Processing (ODP). Lloyd has previously acted as Program Manager for a number of European Commission development initiatives and was a member of the UK GOSIP steering committee. If any further information is required about any of the projects or tools mentioned in this article, please contact the author on Tel: (03) 282 2611 or Fax: (03) 282 2600

### Archie

Archie helps users locate files available from file servers on the Internet. These files could be programs, documents, graphics — anything that can be encoded by anonymous FTP (file transfer protocol across TCP/IP). Archie maintains two databases on a central server: What file servers are available, and the files they contain (currently about two and a half million files, 150 gigabytes of information). Archie maintains information on about 1,000 sites, and handles hundreds of queries per day. The information about each site is updated once per month.

Specifying the name of the file will return a list of servers from which that file can be retrieved. Regular expressions are supported for the file name. Searches are not constrained by any structural hierarchy — flat global searches on the total store of information can be undertaken. On the other hand, lack of structure is also a problem; you cannot find related or similar files. Little additional information about files is kept apart from their name; you need to know (roughly) the file name to find it.

Archie also has architectural problems — it can't be scaled up indefinitely with more information and users because of the reliance on a centralised server. Some improvement has been achieved recently using 'local' replicated servers, including one in Australia.

### Wide Area Information Server (WAIS)

WAIS looks like a commercial on-line information server — it stores articles from various sources that can be referenced by

English queries. It is based on the Z39.50 protocol standard, developed by librarians to support an 'electronic library.' WAIS provides keyword-based retrieval from indexed databases; the information may be text, image, sound or video sources.

There are over 70 WAIS servers around the world, providing access to over 300 databases covering technical reports, books and poetry, the Bible, and more. Dow Jones, one of the backers of WAIS, will shortly introduce a commercial server to make available electronic issues of the Wall Street Journal and other business publications.

The problem with WAIS is its electronic library approach. With conventional libraries, the hard part is finding a library which holds the book you are interested in. Once you have identified a library, it is usually fairly easy to get your hands on the book within that library. In a similar fashion, it is difficult to identify the appropriate WAIS server, but easy to locate the resource within it. WAIS uses a centralised server to maintain a database of other WAIS servers — effectively a list of their specialities.

The decentralised architecture of WAIS servers offers better scalability than Archie, but prevents flat global searches across the whole of the Wide Area Information Server repository of knowledge.

#### Prospero

Prospero is a protocol used to construct a distributed file system, based upon symbolic links. Files showing up in your computer may actually be located on any other computer on the Internet. These files may be directories which contain files located on other machines.

Users can construct collections of related files and make these available for other people to include in their file systems. For example, a user could establish symbolic links to all Internet files pertaining to Resource Discovery, and other users could then browse this collated information; the actual location of each source data file would be transparent.

However, Prospero doesn't address the problem of finding resources. How do you know who, if any, has constructed a list of Resource Discovery files? Hence this tool is more useful for retrieval, as a complement to other resource discovery tools.

#### X.500

X.500 is the ISO/CCITT Standard for constructing Electronic Directories, and it is based on a hierarchical collection of servers at participating sites, maintaining structured information — effecting a single global directory. Its most widespread usage is as a directory for people, although it can handle other information as well. In one current project, it is being applied to reference standards documents.

The scalability offered by X.500 is derived from its strict hierarchical structuring of data. If life is found on Mars, the population can relatively easily be added to a

'global' directory as another node alongside Earth. Unfortunately, this hierarchical model clashes with the needs of Resource Discovery when the search criteria do not conform with the rigid tree structure. In particular, flat global searches are more difficult or expensive to perform compared to Archie, for example (see figure on page 36).

#### Gopher

Gopher is intended as a tool for finding resources. Possessing little knowledge itself, Gopher knows about information stored in other databases and provides the user with access to that information. Gopher has interfaces to Archie, WAIS, and X.500. A Gopher user can access any of these databases through a simple menu-driven user interface, and browse information from sources around the world. Gopher provides a uniform interface to such data, avoiding the need for local knowledge when accessing distributed data. Therefore, it is of some use for people who don't know about the system-specific tools. Simple searches can be performed via X.500, for example; unfortunately, complicated searches still require the user to know about X.500. Gopher's problem is that it simply provides access to the information without integrating the data.

### Three Tough Requirements

There are at least three main requirements to be fulfilled before the performance of Resource Discovery tools can match their potential — they must be simple, powerful and *user transparent*; they must work in conjunction with global *data management* systems; and they must adhere to *distribution* and *security* requirements.

In Australia, the academic and research network (AARNet) international link is very busy, sometimes saturated. Most of the traffic is generated by people fetching files from the US, even though many of the files are available from an Australian server. Users don't know about the Australian server, and they don't know about Archie (which will list the Australian server). Even if they use Archie, it will only give them a list of servers — the fact that one of these servers is Australian is not obvious. People who advertise resources aren't aware either. They will simply announce that the resource is available at a particular server site, unaware of other server sites where it will become available, therefore unable to guide a user to the most convenient site.

This is not simply a problem of education. It is not feasible to teach all network users about resource discovery. Ideally, the network worries about that; users should not need to know about FTP or Archie; they should have tools to use.

We need to provide and store a lot of information about resources, including their features, availability, price, keywords, and source. This information needs to be entered into a repository and subsequently maintained. Data maintenance of the directory

contents should be the responsibility of those who own the resources, and the directory system must tolerate varying degrees of detail describing the catalogued resources. In addition, the resources available across a network are likely to be volatile — so the global directory system should be able to update its knowledge base dynamically.

A good directory has to provide distributed access:

- For people who own the data and need to maintain it (the data in the directory may not be on a local machine); and
- For users who may want to interrogate the directory contents from any location around the world.

For example, a service provider may provide a resource and wish to advertise its availability, but may not allow access to all (for commercial reasons) and will want to ensure appropriate levels of security for other private resources on their site.

Centralised services (e.g. WAIS and Archie) are a performance bottleneck and a possible source of critical failure. Replicating servers distribute the load but create auxiliary problems of consistency and synchronisation. Scalability and consistency problems can be reduced by imposing organisational properties on the data and partitioning the data across servers based upon these properties. However, such structures bring their own disadvantages, as outlined above (X.500).

### Research in the National Interest

The topic of Resource Discovery is regarded as a critical component for ensuring useable future networks. Some significant research activities are:

#### CyberLib — Cybernetic Library

Currently in prototype form in the United States, Cyberlib is an on-line, interactive, multi-user electronic library modelled after such multi-user services as the CB-like chatline on CompuServe (or networked role-playing games).

A user logs on and explores the information space independently, or requests help from a virtual 'information desk.' Help may come from staff or from other logged-on patrons — with whom the user can converse informally just like in the local library. Searches will be assisted using tools such as WAIS. This project is similar to an initiative by NASA: the BOOKS project, which establishes an electronic library complete with reference desk, catalogue and book shelves.

#### INTERNIC

The (US) National Science Foundation has hired AT&T to provide a comprehensive directory and database service for NSFNet, establishing a 'directory of directories' listing all anonymous FTP sites, various types of servers available across Internet, lists of white and yellow page electronic directories, library catalogues and data archives. Access to the resource will initially be given

via a number of ad hoc techniques, with a planned migration to the X.500 standard.

#### CNIDR

The US National Science Foundation has funded the creation of the Clearinghouse for Networked Information Discovery and Retrieval (CNIDR) to promote the development and use of tools for discovering and using networked information and other resources. NSF is funding CNIDR for a 3-year research program, seen as a critical complement to the US NREN initiative which is establishing test beds to support experimental networking in the multi-gigabit bandwidth range. This forms part of the Gore vision to establish a high speed computational and information backbone across the continent.

CNIDR will initially review current usage of the tools described above, and has asked for descriptions of any similar tools being developed. CNIDR has additional support from computer manufacturers, among them Apple, DEC, IBM and NeXT.

To begin with, CNIDR bases its development work on WAIS-like systems, adding support for Z39.50, a developing standard for a protocol to support bibliographic control in electronic library retrieval systems. This protocol was developed in the OSI framework, but most initial implementations run over TCP/IP.

#### Research Data Network (RDN) CRC

In August 1992, the Minister for Science and Technology, Ross Free, announced the Research Data Network (RDN) Cooperative Research Centre. This initiative coupled the improvement of AARNet with a CRC to develop more advanced networking facilities and services. Telecom Australia indicated that their proposed experimental Broadband ISDN network (EBN) would be an ideal vehicle to support some of the proposed research activities.

This new program is led by the CSIRO Division of Information Technology and the University of Queensland, and will form part of the existing Distributed Systems Technology Centre (DSTC) CRC. It is due to commence in mid-1993, and will establish co-operation with similar initiatives in the US and Europe.

Most of the other resource initiatives are US-based, where they don't have our problem with (relatively) limited bandwidth connections. In Australia, Resource Discovery has to be smarter in order to achieve more with less. This is the specific challenge of the Australian project, and if we can develop a 'mean and lean' method for providing resource discovery, we may have a head start by the time others discover what appears to be a universal law of networking: Bandwidth costs money and will always be commercially limited. Bandwidth is increasing, but the usage of networks and resources increases faster — to fill the available space and then a little more, it appears.

**Melfyn Lloyd**

## Technology Update

### ■ Novell and AT&T to Link Servers and PABXs

In yet another attempt to integrate data and voice communications, Novell and AT&T have joined to link NetWare servers with AT&T PABXs. Previous attempts by vendors to convince users to combine voice and data communications in a PABX have generally failed. However, according to both AT&T and Novell officials, the new Telephony Service will take a different approach to the merging of the two technologies. A major feature of the Telephony Service is that users will be able to use their existing phone and computer networks without having to change either the wiring structure or add cards to physically link PCs to the PABXs. The only physical change to the network will be the addition of a wire to link the PABX to the NetWare server. According to officials, voice and data will continue to be handled by separate wiring. Key to the new service will be the Telephone Server NetWare Loadable Module (NLM) which will link Novell's NetWare servers with AT&T's Definity Communications System. The new NLM, which is still under development, will offer users the ability to access phone services such as auto-dialing, conference calling and message management. When the service is rolled out, AT&T's Passage Way will be the desktop interface to the NLM and other products. Passage Way will allow users to take notes associated with each phone call through AT&T's Merlin key telephone systems and to speed-dial frequently used numbers. Novell also plans to migrate the service to other PABXs. This month, AT&T and Novell plan on releasing to developers the whole set of Application Programming Interfaces (APIs). The types of programs that might be developed include: voice-mail management products, simplified conference calling capabilities, and call centre applications.

### ■ Look, Up in the Air — It's FDDI

We've had FDDI over copper, and now here comes FDDI through the air. An Israeli company has launched a device that carries data through the air at much higher rates than were previously possible. The so-called Optical Data Air Link can support data rates of between 5Mbps and 125Mbps for distances of over 125 metres. Its developer, Jerusalem Optical Link Technologies (JOLT), is touting the product as the first FDDI-compatible wireless link. JOLT says its beam needs far less accurate aim than other light-based links, and is safer than other products because it uses LEDs rather than laser beams. The data carrying beams were first used for carrying data from cameras in medical scanners. More recently, they've been adapted for carrying data between aircraft on the ground and airport terminal buildings.

### ■ Codec on a Chip Coming

With the adoption of H.261, the CCITT recommendations for interoperable videoconferencing gear, the new Holy Grail is the coder/decoder (codec) on a chip. To date, codecs have required one or more printed circuit boards, making videoconferencing systems large and bulky boxes at least the size of a PC. The development of a codec on a chip would likely lead to increased flexibility — and decreased prices — of videoconferencing systems. US-based Integrated Information Technologies (ITT) predicts that's exactly what will happen now that it has developed the next best thing to a codec on a chip: A codec on two chips. The company's chip set implements the H.261 compression specs, making it possible to design a full-featured, non-proprietary codec on a card that fits into an AT-bus PC. The company predicts products based on its chip set will cost less than \$US5,000.

### ■ Hub MIB on the Way

The 802.3 Repeater Devices management information base (MIB), also known as the 802.3 Hub MIB, has been completed by a working group of the Internet Engineering Task Force (IETF). The specification is now a proposed standard entitled RFC 1368, 'Definitions of Managed Objects for IEEE 802.3 Repeater Devices.' The MIB will allow SNMP management stations to track packets passed through devices such as hubs that use repeaters.

### ■ Invention Cuts Cabling Ties

An inventor working from a garden shed in the United Kingdom has come up with a device that enables PCs and other LAN equipment to send and receive data through the plastic outer jacket of copper LAN cabling — without piercing the cabling. Called the Watsonline Cable Coupling Transformer, the device allows users to attach LAN equipment at any point in a network without going through time-consuming and costly cable attachment procedures. The Watsonline, which must be placed directly next to a cable's outer jacket, uses a proprietary technique to reduce noise interference while picking up and transmitting data signals. Watsonline-equipped network interface cards (NICs) will appear in the next 12 months, according to inventor, Mike Watson, who says the device's production cost of about \$US5 per unit will significantly increase NIC prices. The Watsonline works with both shielded and unshielded twisted-pair copper cabling, is small enough to fit on laptop PC adaptors and is capable of handling all common local area network speeds, Watson says. The internationally patented invention works just as well with voice signals. Predictably, it has already been licensed for use in telephone surveillance equipment.

# *Some of the world's finest are home grown.*

*Like Australia's world renowned wines our LAN hardware is second to none!*

With a range of world class connectivity products from Australia's only LAN manufacturing company, INC Manufacturing. All with a 2 year warranty and delivery from stock, INC products are available nationally through selected dealers and integrators.



INC offer a unique range of solutions for

## ***Token Ring***

Passive and Active MAU's  
Copper Repeaters  
Fibre Optic Repeaters

## ***AS400***

Passive LWC's  
Active Wiring Concentrators  
Active Stars  
5250 Emulation Boards  
5250 Multiplexers

## ***Ethernet***

10 Base/T Transceivers  
8/16 Mbps Cards  
6 and 12 Port Hubs

Call us on 008 807 982.



INC Manufacturing Pty Limited A.C.N. 051 977 701  
29 Attunga Road, Blaxland NSW Australia  
PO Box 182 Glenbrook NSW 2773 Australia  
Phone 047 39 6111 Fax 047 39 4247

## Applications

## Compaq Consolidates Communications

When moving from the Sydney suburb of Pyrmont to its new head office in Lane Cove last year, Compaq Computer Australia totally revamped its wide area network links between Lane Cove and its other offices around Australia and New Zealand and Compaq's regional head office in Singapore.

Today, the company links over a 64Kbps line between Singapore and Sydney, and can access Compaq head office in Houston via a satellite link between Houston and Singapore. In addition, a 2Mbps leased line is used for voice and data communication between its Lane Cove and Chatswood facilities. The line is controlled by two AT&T PABXs which splits one 64Kbps line out for data communication.

"Compaq had previously been using multiple lower bandwidth circuits using statistical multiplexers," says Ronald Holstegge, Compaq's MIS Manager. "It is difficult to say what the savings were in replacing our old link with the 2Mbps Telecom line because we are actually spending more on communications between our two sites now than we were in the past. In the previous scenario we had five tie-lines be-

tween our old location and our Chatswood warehouse for voice and communications. Today we have the equivalent of 30 digital circuits with voice and data going through a single 2Mbps circuit."

Holstegge claims Compaq's network is now more efficient and reliable than it had been in the past. "It was important for us to implement a high quality network solution, so Compaq's move from Pyrmont to Lane Cove allowed us to vastly overhaul and improve our network infrastructure."

### SynOptics Tied With Vines

The Lane Cove office is wired with Level 5 UTP cabling and contains a SynOptics LattisNet 3000 hub connecting to 108 devices. Banyan Vines runs over an Ethernet backbone to control PCs, printers, fax gateways and Banyan Mail. It also links using TCP/IP to a minicomputer used by Compaq for business applications. This mini is being replaced with a Compaq SystemPro/XL server. The implementation of SynOptics' LattisNet Network Management System (LNMS) and the SynOptics 3000 series hub came after a trial of both products at Compaq's Chatswood facility in January 1992.

"What we have now in terms of communication gear is pretty much the same as in other Compaq offices around the world with the exception of the 2Mbps link. That is something which is unique to Australia," says Holstegge.

Compaq is one of the world's largest Banyan Mail sites and uses it to link its offices worldwide using SynOptics' hubs and Cisco routers. "Compaq relies very heavily on its Banyan Mail system for both local and international communications," says Holstegge.

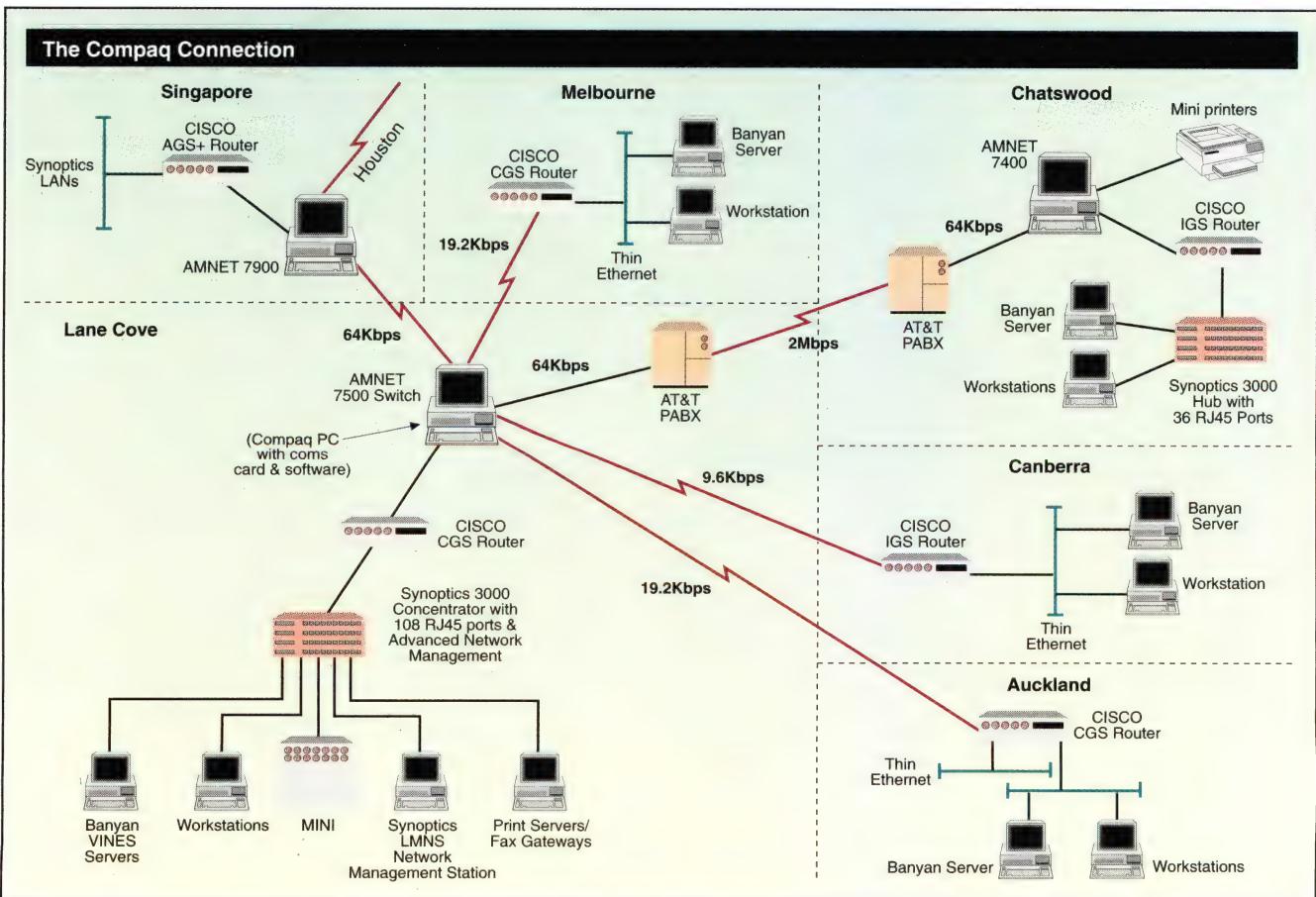
"One of the problems we had in the past was mail bottlenecks, which was a result of the inadequacies in our previous WAN and LAN environments. This meant that mail wasn't delivered in the time frame required. This mail was fundamental to our business so those bottlenecks had to be removed."

Using SynOptics' LNMS the Lane Cove site currently handles the bulk of the firm's network administration for LANs in Lane Cove, Chatswood, Canberra and also in Compaq's Auckland, New Zealand office. In addition, the performance of each of the Australasian networks is monitored from the firm's Singapore head office.

"SynOptics allows us to remotely manage our networks from Singapore, which is a 24 hour operation," says Holstegge, who adds that if there are problems during shutdown times in Australia and New Zealand they are identified on a network diagram in Singapore and acted upon immediately.

"The new network is resulting in greater access to information and is no longer viewed as a negative factor in communications," says Holstegge.

**Darren Edwards**





# From the LAN<sub>d</sub> of Solutions

At LANNET we asked, "Can't we build a LAN where valuable information and computer resources can be shared, easily configured, convenient to implement – yet reliable for the most mission-critical applications?" We put our best minds to work and the result was the creation of our complete range of LAN connectivity products.



From the beginning we've been responsive to the demands of end-users and network managers of small, mid-sized and large local area networks for greater flexibility, reliability and manageability. Today we produce devices capable of supporting multiple protocols, various media types and different topological schemes. It's a new world of networking when you move into LANNET's LAN<sub>d</sub> of total solutions!

## Dataplex

**Melbourne:**

Tel: (03) 210 3333 Fax: (03) 210 3399

**Sydney:**

Tel: (02) 349 3911 Fax: (02) 349 7747



**Melbourne:**

Tel: (03) 242 5050 Fax: (03) 242 5055

**Sydney:**

Tel: (02) 319 2755 Fax: (02) 699 8004

**LANNET Data Communications**

**Intl. Headquarters:**

Atidim Technological Park, Bldg. #3 Tel Aviv, ISRAEL.

Tel: 972-3-6458458 Fax: 972-3-5447146



We Keep You Connected

## Applications

## Downsizing the Auscript Way

Following a Federal Government decision that Auscript (formerly the Commonwealth Reporting Service) must become self funding by mid-1993, the organisation began a major overhaul of its computer system, tossing out nine Hewlett-Packard minicomputers in favour of a LAN-based network.

Using existing X.25 leased lines, Auscript was able to install a Banyan Vines network without the need to purchase routers or bridges to link its 350 PCs in 19 offices scattered around Australia.

The result was the installation of a computer system which has seen document production times decrease by 20% and considerable savings in network maintenance and administration costs. Auscript provides transcript of court trials to a wide variety of private individuals and firms.

According to David Horwitz, Auscript's Information Systems Manager, Vines has a much lower administrative cost overhead

than the mini system and has resulted in decreased user support requirements.

Each X.25 line runs at 9600bps and allows Auscript technical staff and Auscript's maintenance provider to dial into the system from a normal telephone line to check the status of the network 24 hours a day.

"We have become far more flexible without the Hewlett-Packard minis and the Compaq SystemPro hardware we now use is cheaper to maintain," says Horwitz.

With offices in every major city and satellite offices in Paramatta, Newcastle, Darwin and Townsville, Auscript uses Banyan's internal routing capabilities and has two X.25 switches in Canberra and Adelaide.

"Without the need for routers or bridges I can use Vines to alter users' access rights, add new users, check system performance and carry out other administrative functions in a fraction of the time it would take using conventional methods. The physical location of the server being accessed is not important, as the communication path is totally transparent."

Auscript began replacing its minis and dumb terminals in early 1991 with some 350 DEC 386SX PCs. It also began to install WordPerfect 5.1 and developed in-house a

menu system for its users using WordPerfect's macro language. The new system can merge transcripts at least 10 times faster than the old system, says Horwitz.

"When selecting the network operating system to replace the minicomputers we evaluated the two most current releases of Banyan and Novell and the result was very close. Banyan won because it was suited to our distributed network and had better wide area network and communications capability which meant we didn't have to replace our WAN links."

"We now use the Mail component of Banyan very heavily for internal correspondence, which allows us to save on faxes and phone calls. We transfer documents with it and have greatly increased productivity, and the ability to offer services we couldn't have offered in the past with our old system."

Auscript is currently looking at introducing a number of dial-in client services, including a bulletin board which would allow clients to collect transcripts of trials electronically. "We also have the potential to begin using EDI via X.25 and we have looked at the feasibility of that, but it would have to be a client driven initiative."

**Darren Edwards**

### *Broadcast Facsimile from page 35*

Obviously this black box is quite a complex piece of electronic wizardry: It holds 4 megabytes of RAM, two processing chips, a bunch of non-volatile RAM, and provides RS-232 and fax outputs. It also includes its own tuner so you don't need a TV set alongside, and your Faxcast box can later be switched to use the vertical blanking interval on any other TV channel when more bandwidth is needed. The box also has input ports for composite video (from a separate tuner) and can accept a clean data feed directly from say, a satellite or terrestrial channel devoted to data only.

Information sent over the airwaves is encrypted and held in memory before being printed out: there's a changeable security 'dongle' on the back of the machine which can be easily swapped if someone ever manages to break the encryption algorithm.

The front-panel of the Faxcast box has an LCD display which shows the title of the current fax in the memory-queue, and there is a small keypad for the user to enter passwords and control payment and print-out.

Pre-payment for the information (as distinct from the rental of the equipment) is made by quoting credit-card numbers over the phone to the information provider. These arrangements can be made on a straight-out subscription basis, or on a pay-for-usage basis where the provider will credit your Faxcast unit (over the air) with 'tokens.' These tokens are consumed progressively when information is received from that provider (the electronic 'publisher').

Impulse Pay and Print (IPP) is another innovative way of distributing less-specific information. IPP material is transmitted to groups of Faxcast units on the basis of 'Pay-only-if-you-print' the information. Both the title and the price are displayed on the LCD, and if you choose not to print out the file it will simply be over-written by new material arriving. All messages are stacked in memory in first-in, first-out order, irrespective of whether they are ASCII or fax image files.

And you don't need two faxes to use the system. The Faxcast box has a 'smart' switch which controls your dedicated fax line and allows information to pass to the fax printer on a first-come-first-served basis. If the fax machine is busy with a telephone message, incoming broadcast messages will simply feed into computer memory. When the wire-line message has finished, the Faxcast box will switch over and deliver the stored information to the fax printer, or continue to hold it in memory until the password is keyed in and/or payment made (in the case of IPP).

For police, defence and emergency use, a special Priority Zero code can be transmitted which will force the switch to disconnect any wire-line activity and take ultra-high priority messages immediately.

There's one further innovative feature which deserves special mention. The television station transmits a 'Heartbeat' signal every 10 seconds which all Faxcast receivers need to detect. If they don't detect the Heartbeat an alarm will sound. Also, if there is any disconnection of the power-supply (for up to 72 hours) there will be automatic audible, visible and printed alarm messages.

What's more, the Heartbeat signals also carry, on a rotational basis, identification codes for all messages transmitted in the last 24 hours. So a reconnected receiver will automatically check its own log of received messages against the rotating Heartbeat list, and inform you if something important has been missed.

There's actually quite a bit more to this system than we've got room to discuss here. There's a polling system using wire links, and audit trails, and a reporting system. The Faxcast operator can make over-the-air modification to the operating system, and can 'enable' (and disable) individual Faxcast boxes (or groups) so that they can receive any specified addressed or type-tagged file.

I must say that I'm impressed with how well this company has thought out the system and the useful extra features. It's not hard to see that Faxcast has the potential to become an important new form of communications media within certain niche markets, and it has the potential to extend wider into the general community when cheaper fax machines become common in the home.

There's no reason why the Faxcast electronics can't eventually be incorporated into most new facsimile machines, and they should eventually be selecting from an enormous variety of information transmitted over terrestrial TV, satellites and data-radio broadcasts. That won't happen, of course—but not because the technology is inadequate. Next year there'll be three hundred competing systems, all with incompatible addressing and tagging standards!

**Stewart Fist**

# The Titanic Mentality



Graeme Le Roux

In April of 1912 the *RMS Titanic* represented the leading edge of maritime technology. With her 16 water-tight compartments and assorted other design features she was considered unsinkable. On the evening of the 15th of that month she struck an iceberg in the north Atlantic and sank with the loss of 1,500 lives. It was discovered later that she had an inadequate number of life boats and that many of them had been launched without a full load or an adequate crew. The *Titanic* was the victim of a basic human psychological trait — an inherent unwillingness to face the possibility of adverse events. Put idiomatically, 'She'll be right mate' or 'It'll never happen to me.' Unfortunately, a large number of network administrators happen to exhibit this trait.

Try a simple thought experiment. It is 07:00 on a Monday, you are a network administrator and you have come into the office early to work on an end of quarter budget report. As you read the draft of your report drinking your first cup of coffee you hear a bang from your server and the aroma of coffee is replaced by the stench of vaporised electrolyte. Your server's power supply has blown. At this point what caused the problem is irrelevant. What is relevant is that you have about 90 minutes before the bulk of your users find they can't work as normal. What are you going to do? Consider also what would happen if you were on holiday and the company PC technician arrived at 08:15 and found the server down?

Your first problem is to get the server running again so you can assess the degree of damage. Note that the loss of the power supply is not the main problem. The potential for system damage and data loss is far more important. As far as the power supply is concerned you have two basic options. You can either replace the unit or move the server's disk and network adaptor to another machine. Replacing a power supply at 07:00 on a Monday morning means either use a spare part you have on hand or temporally cannibalise another machine. Even if you have a service contract with an organisation that provides 24 hour cover your chances of an engineer with a spare part arriving before 08:30 are practically nil.

In most cases at present, an administrator would have no option but to cannibalise another machine — but which one? If a workstation with a suitable power supply exists, where is it? Can you physically get to it at this time of the morning? Have you cleared using it with the user? If your server(s) are machines that have unique power supplies you will have to shut down another server and use its power supply. Which server will you shut down? As an administrator you might be able to make that kind of decision, but what if you aren't around?

Assuming for the moment that you do have a spare power supply and that you successfully install it — a process that will take about 15 minutes — you now have to face the possibility that the server may have a corrupt hard disk. It is more likely that only a small number of files will be corrupt, but you then have to identify them. Do you have any idea how to do this? The average server these days has about 1 Gbyte of hard disk storage and will probably store several thousand files. If just 5% of them are corrupt — probably 30 Mbytes or so — how are you going to find them? Is there a NOS or third party utility you can use? Where is it? On the server perhaps? How

do you use it? How long will it take to verify all files? You only have an hour and a quarter. This is no time for rushing around the office looking for manuals and then trying to find some obscure reference to disk utilities.

By the way, have you disabled logins to the server in question or are early birds currently logging on to the server and editing files you may have to wipe in a restore from your evening backup tape?

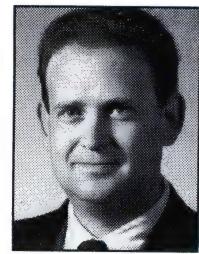
As you have probably guessed my point in this article is that developing procedures for disaster recovery and crisis management is a necessary part of network administration. The IT industry is now producing some of the most reliable and fault tolerant products in its history, however, the fact remains that network system components break — and they usually break at the most inconvenient times. As a result there is little time to waste in recrimination, procrastination or consultation. The members of staff who are landed with the problem have to work as a team (or individually) to resolve it in minimum time and at minimum cost. Staff must have their options clearly defined. If a staff member is faced with the situation I've described above then he or she must know that management has cleared the removal of a power supply from a user's PC or that another server may be shut down to provide spare parts. Which PCs and servers are least critical must also be clearly defined.

The distinction between a set of procedures or guidelines which define available options in a given situation and a rigid set of instructions for dealing with a crisis must be understood. Your staff must be permitted to act on their own initiative rather than be restricted to a set of actions that probably do not precisely relate to the situation. Network administration staff generally are not fools. If your procedures are inappropriate or unreasonably complex they will probably ignore them. In any case, such a set of rules will require a document which is far too large to be practical. If you concentrate on providing your staff with a single source of relevant information and options you may be surprised at just how small a document you end up with. I find that a single A4 ring binder is all that is required and all that is practical in an emergency. It's also a good idea to choose a binder of the most nauseatingly iridescent colour you can find. That way it can be spotted easily even across the office.

Producing such a document can also be a useful training exercise. By conducting the sort of thought experiment I've used here as an example, and getting your staff to work through it as a group, I find that you get three beneficial results. Firstly, your staff learn to work as a team; second, they learn crisis management theory; and third, they provide you with information you need to fill that folder. You can also use such meetings to analyse the management of a real crisis. Post-mortems are also a useful training exercise. Generating the sort of procedures I've described here is one of the few things about networking that costs almost nothing. No expensive test gear, no special purpose software, just a little time and mental effort. Failure to set up such procedures is inevitably expensive and frustrating for your users and your staff.

*"Staff must have their options clearly defined."*

*Graeme Le Roux is a Director of Moresdawn Pty Ltd (Bundanoon, NSW) and specialises in local area network consulting services.*



Robin Layland

## Is APPN on the Ropes?

IBM has taken a beating in the internetworking market. Its front-end processors (FEPs) are increasingly being displaced by routers. IBM's own router, the 6611, is late, and will have to fight an uphill battle against established vendors. Now, what could end up being a knockout punch has been thrown. It comes in the form of Advanced Peer-to-Peer Internetworking (APPI) from Cisco Systems. APPI is Cisco's version of Advanced Peer-to-Peer Networking (APPN), IBM's routing scheme, with which it intends to bring internetworking to SNA. Cisco is proposing APPI as an industry-standard open alternative to APPN, which Cisco says is less than truly open and lacks most features users want — chief among these being interoperability.

APPI comes as a big blow to IBM. APPN was going to establish Big Blue's presence in the router market and keep existing SNA customers firmly in the IBM camp. And since IBM holds patents on APPN, other router vendors would have to come to it for licensing — and pay a hefty fee for the privilege. Up until August last year, things were going as IBM has planned. Vendors were journeying to its Communication Systems Division to wait in line for their copy of APPN. IBM even played favourites, working at first with a few select partners, including Apple Computer, Network Equipment Technologies, Novell, Systems Strategies, and 3Com. The rest, including major router vendors, would have to wait.

Perhaps IBM has its reasons for handling things this way. Big Blue has said that APPN specifications are not ready for mass distribution. But Cisco not only got in line for APPN (to cover for its bases), but announced APPI. And held the first meeting of its APPI Forum at Interop last October. The group comprises vendors who want to see APPI become a de facto standard. The decision to distribute it without charge will certainly help. Can Cisco do it? Some might remember Cisco's intentions to deliver full PU4 capabilities in its routers, which it later modified to PU4 'properties.' Unfortunately for IBM, Cisco is most likely for real this time. Moreover, there looks to be far more demand — and financial incentive — for APPI. It's the only alternative to paying royalties and playing in an IBM-controlled market. The first version of APPI, planned for the third quarter this year, will let Cisco routers (designated 'Open Network Nodes,' or ONNs) perform the two key functions of APPN's Network Node — directory services and routing. A second release, slated for 1994, will implement the remaining APPN functions, including the ability to route an active session between two nodes over different paths.

Right now, when an APPN End Node requests a session with another End Node, a Network Node takes the request and uses its directory service to determine which Network Node is closest to the destination. The Network Node then determines the best path between End Nodes. By keeping track of the router closest to the End Node being sent a message, Cisco's directory service lets its ONNs do much the same thing. The software intercepts registration information that an APPN End Node normally sends, including the End Node's LU names. The ONN uses these to build a local name cache and shares information with other ONN routers or with an ONN router set up as a central directory.

Can Cisco build this sort of directory service? Well, it already uses a similar process to grab NetBIOS and 3270 data and retransmit

it encapsulated in TCP/IP. The APPI directory service simply takes things one step further.

What about APPN routing? APPN's proprietary routing method closely resembles IP's OSPF (open shortest path first) routing, currently used by many vendors. Cisco will route APPN data using the same technique it employs for 3270 and NetBIOS data, an older approach called IGRP (Interior Gateway Routing Protocol). Using IGRP with APPN will not be a major technical challenge for Cisco. And it also offers OSPF in some products, so it could conceivably go with that algorithm instead. Where APPI should really outshine APPN is interoperability. It looks as if APPI routers will be readily compatible with their TCP/IP counterparts, something that APPN can't come close to rivaling. This alone should give APPI a big boost.

A simple example should help illustrate the differences between APPN and APPI. Let's say that two divisions of a company buy IBM 6611s (Division A and C), while a third (Division B) goes with Brand X boxes (neither APPN nor APPI). All the users on the 6611 networks are running IBM's APPN End Node protocol on their workstations. The 6611s function as APPN Network Nodes.

To get from Division A to C, a session has to pass through Division B (home of the Brand X boxes). Since APPN is being used at each End Node, every router on the path must implement APPN, including the Brand X products, or the message will not get through. Of course, the company could buy an extra leased line to establish a direct connection between the two divisions using 6611s — an expensive alternative, or it could scrap all the Brand X boxes and replace them with IBM equipment — sure to make Big Blue happy. Neither alternative is going to make a network manager happy.

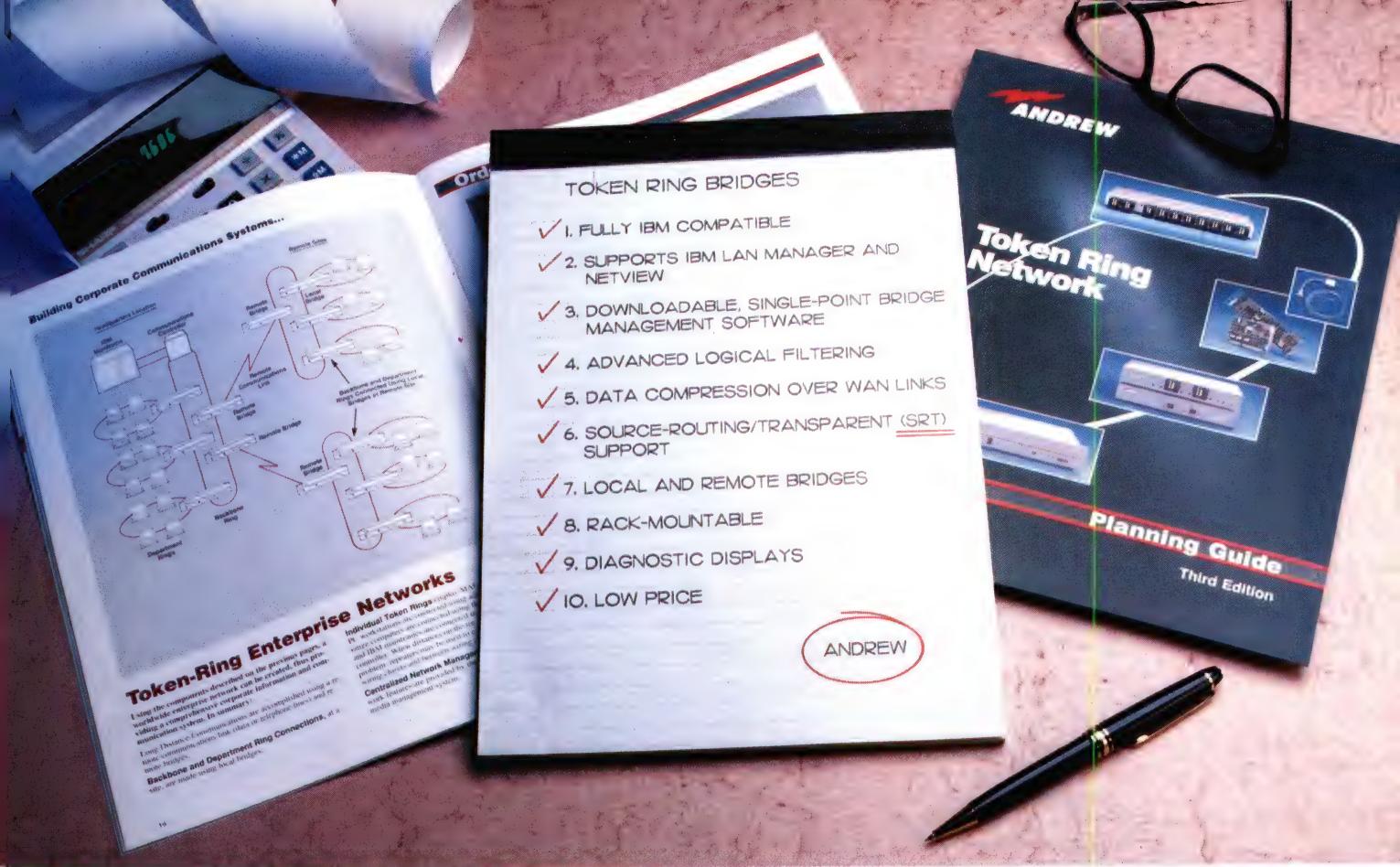
APPI solves the problem. If Cisco APPI routers were used in place of the 6611s, the Brand X boxes would not be a cause for concern. That's because APPI uses IP routing and encapsulates APPN End Node traffic in IP. (Actually, the term encapsulation is something of a misnomer, since only the IP header replaces the APPN header. The rest of the packet remains unchanged.)

It is true that if the intermediate routers (in Division B) do not implement APPI, the network will lose some relatively unimportant features, such as re-establishing session priorities at intermediate nodes. That's a small price to pay, though, for interoperability. And Cisco may well be able to deliver all APPN functions with its second release of APPI. But IBM has plans for a version of APPN that uses IP routing, scheduled for delivery soon.

In other words, Cisco and IBM agree that APPN over IP is needed to ensure interoperability. Too bad that's the only thing the two seem to agree on. Cisco is pushing ahead with APPI and IBM hasn't given any sign that it's willing to change its APPN policies in any way.

Whatever happens, though, net managers needn't be in a big hurry to choose. For one thing, neither APPN nor APPI is available yet for routers; for another, it's possible — with a little creative engineering — to gain the benefits of APPN or APPI without making a full commitment to either scheme.

*Robin Layland is an engineering consultant in charge of network architecture at US-based Travelers Insurance (Hartford, Connecticut).*



# Bridgeport: Turning Token Ring Wish Lists Into Reality

If you made a list of everything you wish for in a token ring bridge, you would be describing **Bridgeport**™ from Andrew.

**008-803-219**

Bridges are just one of our many LAN connectivity products. The **Andrew Token Ring Planning Guide** explains how to optimize your LAN and get the most from your system. Call for your free copy.

Bridgeport local and remote source-routing bridges are designed to meet your needs. Data compression improves WAN link performance. Configurable frame filtering increases ring throughput. **Source-Routing/Transparent** support provides flexible connectivity for your evolving network.

Changing bridging parameters and requesting LAN segment information is easy because Bridgeport is fully IBM compatible and supports any IBM or NetView LAN Manager.

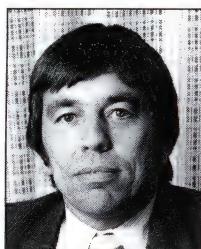
Centralized bridge management makes downloading new operating code and configurations quick and efficient.

Whether it's your desire to connect LANs within the same building or worldwide, **Bridgeport** makes your network wishes come true.



*Complete Communications™*

**ANDREW**



# OSI Virtual Terminal

Alan Lloyd

People usually access host computers via a terminal. Over the years there have been many types of computer terminals developed, usually in conjunction with the many proprietary hosts to which they were connected. Because of the number of different computer vendors, this resulted in a wide range of quite distinct terminal types.

A more important factor in the variety of terminal types was the host resident applications that provided control of these terminals. They were written in such a manner that the terminal type and the application itself were locked together. As a result, a terminal could not access other applications with different terminal processing routines and different types of terminals used different types of communications protocols. Neither characteristic was very conducive to open systems.

Resolution of these two problems is the goal of the common terminal environment known as the ISO Virtual Terminal (VT) and the communications architecture of OSI.

Over the years, a number of major changes have occurred with terminal and host access environments. Users now have a requirement to access multiple types of host from a single terminal. We have seen the introduction of terminal emulators within networking equipment and the introduction of terminal emulators in PCs and workstations. Progress has brought the rationalisation of terminal types and the introduction of ISO Virtual Standards. Finally, in recent

years we have seen the development of Windows and graphics-based terminal systems.

Collectively, these changes mean that applications do not have to support the same variety of the non-intelligent terminal types as they did in the past.

## A Consistent Interface

The ISO VT standard is designed to provide a consistent interface between asynchronous or blockmode/synchronous terminals and the applications that handle them, no matter what the terminal system is.

The VT standard is defined in *ISO/IEC 9040 Virtual Terminal — Basic Class Service*. Essentially, it provides a parameterised terminal data and control interface that relies on passing a number of well-defined parameters to set up the required terminal environment. This abstract interface is called the Virtual Terminal Environment (VTE) and is targeted at permitting the application writer to develop terminal-based applications independent of the physical terminal type. It also permits the developer of the terminal controller to produce a terminal system independent of a specific host application. The VTE with its terminal and host application components are illustrated in Figure 1. In terms of the VT service, these terminal and host application components are defined as the 'VT User.'

Like other OSI standards, the VT standard establishes an environment independent of any real operating system. Although VT

This is one of a series of open systems tutorials by Alan Lloyd, Strategic Developments Manager for Datacraft Australia. Alan represents Australia on numerous international standards bodies and is the co-author with Gary Dickson of *Open Systems Interconnection* (Prentice Hall, 1992).

is specified for asynchronous and synchronous type terminals, such as Basic, Transparent, CCITT X.3, 28, 29 and Telnet, others, such as 3270, X.11 could also be supported by either passing this terminal information through the basic or transparent types or by defining new types of VTE parameters.

The VTE is defined as a set of parameters that define the data structuring and operational characteristics for a particular VT association. It is an abstract concept realised by the Conceptual Communication Area (CCA). VT users (those with a VT application and VT terminal device) communicate by means of this shared CCA which contains a number of abstract objects that relate to the data flow and control of the terminal system.

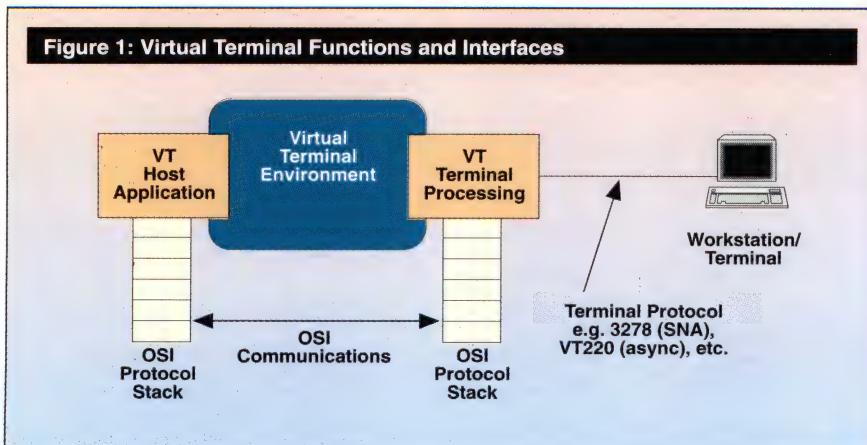
The CCA comprises:

- i. The Conceptual Data Store (CDS) with associated Display Objects;
- ii. The Control Signal and Status (CSS) store with associated Control Objects;
- iii. The Access Control Store (ACS); and
- iv. The Data Structure Definition store (or DSD).

In the operation of the CCA each VT user (i.e. the host and the terminal applications) initially agree on the VTE parameters for the terminal characteristics. Then, during normal operation, the objects contained within the CCA model the state of the terminal session and display the terminal data. Updates to the information contained within these objects made by one VT user are then made available to other VT users. In essence, the CCA puts a consistent interchange framework around the terminal processing between an application and a terminal device.

The CDS is used to store the information about the information to be displayed or entered with a keyboard. The data is stored using the conventions adopted within the VT standard, so it is neutral to any terminal equipment. The data within the CDS is contained within one or two Display Objects.

**Figure 1: Virtual Terminal Functions and Interfaces**



The choice between using one or two Display Objects depends on whether the 'A' or 'S' VT mode is used.

The Display Objects model the terminal screen and its keyboard. A Display Object is defined as a one, two or three dimensional array of character elements. Each element in this array can contain one character selected from a character set (character sets are called repertoires). Each character element also stores the attributes of the character, such as character repertoire, font and colour.

The CSS store contains a number of Control Objects. Control Objects are used for virtual terminal functions and real control of devices such as a terminal or printer. They are also used for signalling and status information. For terminal input, Control Objects handle the context of the input, the field definition, field entry validation, field entry condition and action and terminal input transmission policy for specific field types. Other Control Objects deal with input termination, its conditions and character echo.

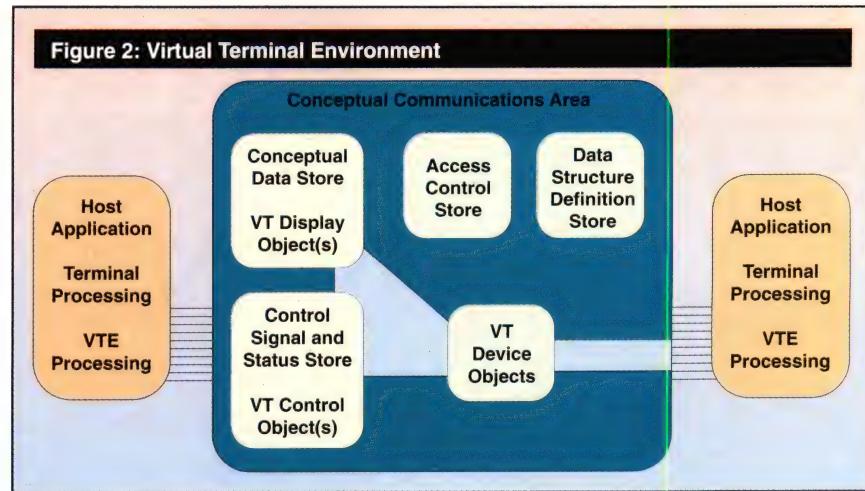
A Reference Information Object (RIO) is a specific type of a structured Control Object. RIOs contain information for reference while a VTE is in use. Since the RIOs are specific cases of a Control Object, they can contain information permitting certain control actions, such as the definition of the cursor character.

Device Objects are the mechanism for specifying device characteristics to enable mapping to real devices.

The Access Control Store (ACS) is used to record which VT user has write access to the CCA. The access control mechanism is implemented via a set of Access Control Tokens which are exchanged between the VT users via the VT protocol.

The DSD store contains the object type definitions for display objects, control objects and device objects. It is also used to store all other negotiated VTE parameters.

With the number of terminal devices in use, such as monochrome and colour displays, printers and line printers, you might expect a great number of terminal device



classifications within the VT standard. This is not the case. The standard does not attempt to sort and classify the terminal devices available but aims to provide a generic tool which can be used well into the future when even more terminal types are defined.

The VT standard specifies two possible modes of operation: Synchronous Mode and Asynchronous Mode. The modes are engineered into the architecture, functionality and protocol of the VT service. These modes are not related to synchronous and asynchronous types of communications.

Synchronous Mode (S-mode) is equivalent to a half duplex operation for block mode type terminals. Only one display object is maintained and the initiator and the write access rights are passed from one user to the other initiator/acceptor. In this mode, the human user might update a number of fields and submit the data to the host application. In response, the host application can send down a new block or page of information for display.

Asynchronous Mode (A-mode) is equivalent to full duplex operation. Two Display Objects are maintained in this mode. One Display Object can only be written to by the VT-association initiator and the other can only be written to by the VT-association ac-

ceptor. In this mode there is no control over who has write access rights at any given time since the two VT-users (initiator and acceptor) are writing to separate Display Objects.

In addition to the two VT modes of working, four types of VTE profiles are defined. Profiles are an agreed set of parameters, defined by the users of the VT service, for common terminal types, such as Transparent, Basic, Telnet and CCITT XXX (X3/28). They cater for the majority of non-intelligent type terminals. Other profiles will be developed in the future.

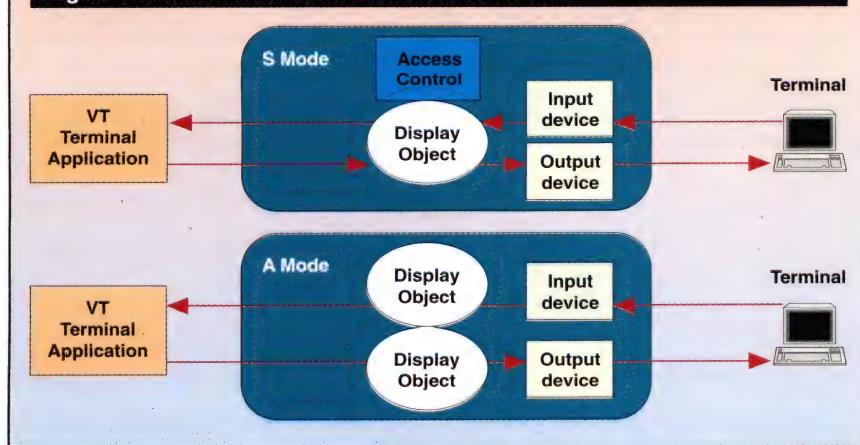
There is a down side to the VT standard, however, in that it does not address the older type of terminals and their related applications. If VT is to be implemented with an application based on older terminals, the application and the terminal controller must be rewritten to deal with the underlying VTE concepts. This is usually not justified if there are a limited number of terminal types involved. The process will only add complexity for probably little benefit. VT's future is also problematical. Because of newer terminal technologies and the increasing graphical content in information exchange, the standard will most probably be superseded by a graphics-oriented standard like X-Windows.

If the move to OSI is going to support terminal traffic, simplicity in the application, terminal equipment and communications protocols is essential to ensure adequate terminal response time. From an engineering point of view, and to maximise performance gains, it would seem a lot simpler to implement the terminal traffic, no matter what the terminal type, over generic application communications services such as ISO Remote Procedure Call (RPC) or OSI Remote Operations Service Elements (ROSE). This would provide the common OSI application layer infrastructure needed in OSI-based networks, while at the same time simplify terminal applications and operations.

Should VT type facilities such as conversion and emulation be required, then PC and network-based emulators are a viable and readily available VT-type alternative.

Alan Lloyd

**Figure 3: A and S Mode Virtual Terminal Environment**



# For Networks, MPA has the Banyan Connection.



Banyan is the network system that has set the whole world talking. It's designed to begin small and grow easily, quickly and inexpensively. That's why Compaq have been using it since 1987. At one stage they were adding a server *every day* somewhere in the world. Now, with 11,300 network resources to look after, administration has to be simple and responsive. That's powerful. That's Banyan – networking without limits. MPA take an outstanding product, add outstanding technology, and deliver outstanding service.

MPA. 37-51 Lusher Road, Croydon 3136, Australia.  
Melbourne (03) 724 4444, Sydney (02) 906 4499, Perth (09) 4811222, Brisbane (07) 832 4065, Canberra (06) 243 5119, N.Z. (9) 358 2888.

MPA  
SIMPLY OUTSTANDING  
TECHNOLOGY

# Clearly Complicated Connections in New Zealand

No issue more starkly illustrates the difference between New Zealand and Australian telecommunications regulation than inter-carrier interconnection and access arrangements.

The recent decision of the New Zealand High Court on the Clear-TCNZ negotiations has left both Clear and Telecom claiming victory. When both sides claim victory, this usually means that the lawyers were the real victors, and the Court either got it right, or got it so wrong that neither side understands what the judge said. So what's the verdict?

The joint judgement of Mr Justice Ellis and economist lay member Professor Maureen Brunt followed 28 days of hearing and runs to over 100 pages. The case was unusual in that most of the witnesses were experts: Five economists, two accountants and two telecoms numbering experts. The experts included the renowned US regulatory economists Professors Baumol and Kahn. The judgement clearly reflects the expert economist hand of Professor Brunt. It is impossible to adequately summarise such a complex and closely reasoned judgement in this *Legal Line*. The account below is but a brief overview.

## The Battleground

Clear wishes to supply local switched service ('Gateway') principally to business customers and sought trunk-side interconnection between Telecom switches and Clear switches in Wellington, Auckland and (a proposed switch) in Christchurch. Protracted negotiations broke down over Telecom's pricing demands and a request that Clear's customers use a three digit access code to 'communicate to the caller the essential piece of information that the call is moving into another network.' Clear sought no-code access (exchange conditioned preselection in Australian terms).

The essence of the dispute was price. Clear proposed that each network be responsible for tariffing and billing of their own customers and retain all revenue, and offered to contribute to the exchange costs of providing no-code access. In other words, Clear suggested that there be no charge for terminating calls in each other's network or, alternatively, that the only charge be a settlement adjustment (akin to international traffic agreements). After considerable delay, Telecom counter-proposed a commercially negotiated access charge 'as a fair contribution to the Telecom network and infrastruc-

ture,' alleging substantial cross-subsidy from toll to local calls and from business to residential customers. Following consultations with US experts, Telecom's position hardened: It proposed that Clear contribute to its overheads generally, on the basis of revenue foregone as the result of the Clear interconnection — in economist cant, the 'opportunity cost.' Further negotiations stalled. Enter an army of economists and lawyers.

## KOed by the KSO?

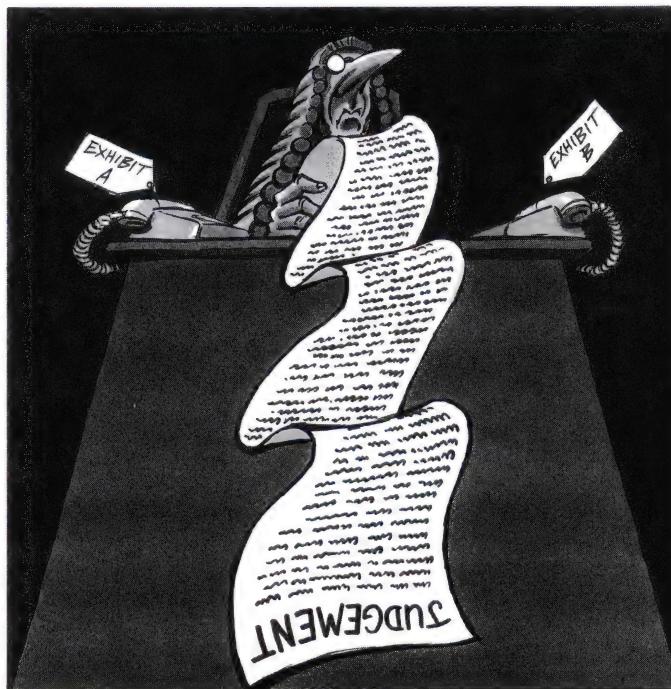
Cross-subsidy is endemic to the NZ network, largely as a result of obligations (KSOs) attaching to the Kiwi share. The new owners of the privatised Telecom agreed in 1990 to: Retain free local calling as an option for residential customers; freeze the real level of standard residential rental charges 'unless profits of regional operating companies are unreasonably impaired'; and also maintain equal line rental charges for urban and residential customers. The extent of cross-subsidy was hotly in issue — as was the question of whether KSO cross-subsidy should be factored into inter-

connect pricing. Accordingly, the interconnection pricing negotiations were inextricably intertwined with costing this cross-subsidy.

## Court's Methodology

The Court's legal analysis concluded that the relevant *Commerce Act* provision — the counterpart of section 46 of the Australian *Trade Practices Act* — did not prevent a monopolist setting monopoly prices — i.e. charging what the market will bear. Further, a dominant carrier was under no obligation to assist a potential competitor by adjusting its prices to levels that would pertain in a competitive market or otherwise, to facilitate market entry by the competitor. Rather, the real question was 'has Telecom used its dominant position in the market in order to restrict Clear's entry or preventing or deterring Clear from engaging in competitive conduct in a market?'

The Court endeavoured to answer this question by analysing network costing to derive efficient pricing principles. The Court's analysis proceeded from a view that if Telecom's pricing demands did not reflect efficient pricing principles, these demands could not



be justified, and if it persisted in those demands contrary to accepted principles 'it would plainly be using its admitted dominance in the national market for telecommunications services for the purpose of preventing or deterring Clear from engaging in competitive conduct in that market.'

### **Living by the Rule**

Telecom sought to establish that its proposed basis for interconnection pricing complied with 'the efficient component pricing rule.' This was stated by Professors Baumol and Willig as 'the incremental cost to Telecom New Zealand of supplying interconnection, including both the direct incremental cost of producing the interconnection and the opportunity cost of contribution foregone by Telecom New Zealand as a result of Clear's utilisation of the interconnection.' The professors concluded that as 'an important component of Telecom New Zealand's opportunity cost is the cross-subsidy to household users,' that cross-subsidy should be factored into the interconnection price.

Dr Kahn accepted that Telecom's margin may properly exceed its marginal costs, to include the loss of cross-subsidy towards the KSO and the loss of any contribution to Telecom's common costs arising from diminished economies of scale and scope. However, the resultant price should not contravene 'the principle of competitive parity'—being (as paraphrased by the Court) 'Telecom must charge Clear the same price as it charges itself, allowing for any differential cost. That is, Telecom's price of access to Clear must not exceed its own retail loop charges, i.e. its rent for local business service (NZ\$725) minus any net savings in incremental costs.'

In applying the rule, the Court noted that there are three components of Telecom revenue: Average incremental costs (AIC), network common costs and (possibly) monopoly profits. In the absence of any evidence from Clear to the contrary, the Court assumed that Clear would only enter the market if it could supply its part of the network at less than Telecom's AIC for that part. It would then be able to compete within the margin created by its superior efficiency in relation to that part of the network. If Telecom priced for interconnection in accordance with the rule, it could only reduce its retail price to compete with Clear at the expense of contribution to Telecom's common costs or monopoly profit, which (through application of the rule) must immediately be passed onto Clear as a reduction in the interconnection charge (as this charge should mirror lost opportunity costs). As stated in the judgement, 'the effect will be to strip away Telecom's monopoly profits (if any) and put pressure on it to reduce common costs and its own incremental cost. Just what the *Commerce Act* was designed to achieve.'

Application of the rule then leads to the following principles:

- For calls from the Telecom customer into the Clear network, Clear can charge Telecom Telecom's AIC saved by Clear carrying part of the calls;
- For calls from a Clear customer to the Telecom network, Telecom can charge Clear its call rate less Telecom's AIC saved by Clear carrying part of the calls; and
- For access to the PSTN, Telecom can charge Clear the equivalent of its line rental less Telecom's AIC saved by Clear providing part of the loop.

### **Difficulties with the Rule**

The rule has inherent difficulties, many of which were analysed at length in the judgement. Only some difficulties are discussed below.

First, application of the rule requires close monitoring of Telecom's retail prices, and dynamic adjustment of the access and traffic charges. The scheme is therefore complex and difficult to administer. Telecom would only be entitled to retain economies or reductions in its own AIC — any reduction in the monopoly profit or common cost element involved in providing cheaper services to its customers should be immediately passed on to Clear through reduced access and traffic charges. In the absence of detailed cost allocation procedures and models, how will Clear assess Telecom claims that price reductions flow from reduced Telecom AIC?

Second, how is the KSO subsidy quantified and factored into calculations? The Australian experience with quantifying the universal service levy amply demonstrates that it is no simple process to determine whether cross-subsidy in fact exists, let alone quantify its extent. Clear also argued that if there was in fact subsidy, its impact was absorbed by the price Telecom shareholders paid the Government for their shares and/or was a matter between Telecom and the Government. The Court rejected this argument and concluded 'that as a matter of principle any subsidy which business access and traffic revenues gives non-business access and traffic revenues is to be viewed as part of the contribution to common costs . . . Moreover, even in the absence of subsidy, there may still be a required contribution to a KSO element of common costs to be made by business services and so payable by Clear.'

### **Monopoly and Competition**

Next, application of the rule does nothing to cause Telecom to reduce monopoly profits or reduce its common costs. This prompted a submission by Clear that 'if Telecom insists on a theory of charging that enables it to recover for inefficiencies or monopoly profits, it is possible to infer not only use of a dominant position but also anti-competitive or exclusionary purpose.' Professor Baumol conceded that the rule did not attempt to control the level of Telecom charges, but said that this was not the rule's purpose: It was designed to secure equality in the charges that Telecom imposes on itself for its comparable interconnection. The Court did not express a view as to whether Telecom was earning monopoly rents. It accepted Telecom's submission that extracting monopoly profit is not, in itself, proof of anti-competitive purpose. The Court conceded that an interconnect price derived by application of the rule might preclude development of competition and therefore be exclusionary, but concluded that the rule was 'more likely than the alternatives to improve efficient competition in New Zealand telecommunications.' The Court concluded that investigation of whether there were high monopoly profits or inefficiencies was a matter for a regulatory agency, and not a matter for determination by a judge. It is apparent that the Court did not see its role as creating policy for development of effective competition.

The Court concluded that the parties had each taken extreme positions on matters of principle but that, in particular, Telecom had demanded more money or contribution from Clear than it could justify and that it had not accepted Clear's position as a network operator. However, the delays in resolving the matter were probably not more than would have occurred in any event had the parties agreed on matters of principle and endeavoured to agree on prices for implementing those principles. Accordingly, Clear had not suffered any loss as a result of Telecom's excessive demands. The Court also concluded that Clear would, in any event, not have accepted an offer by Telecom in accordance with the principles, and for this reason also, Clear had suffered no loss. In effect, the Court laid down the principles and sent the parties off to negotiate prices.

In the writer's view, the judgement is a commendable effort to integrate legal analysis with economic reasoning. However, it is difficult to see the judgement as refuting the conclusion of the NZ Commerce Commission in its June 1992 Report that 'there are a number of problems with relying on the *Commerce Act*. It involves using the judicial system to resolve complex business issues in a fast moving industry where time means money even more than in most industries. The Act is designed to promote competition; and it does not deal particularly well with the problems that occur in an industry where a critical input, the PSTN, is a natural monopoly . . . section 36 [the relevant provision in the Clear/TCNZ case] cannot really provide for remedies for denial of supply or impose competitive terms and conditions of supply, without requiring the courts to stand in the shoes of business people and make business decisions.'

---

*Peter Leonard is a partner with the Sydney technology law firm, Gilbert & Tobin, and specialises in telecommunications and information technology contracting and regulation. This column sets out his views and not those of clients of his firm.*



## Warwick Smith, MP

*Shadow Minister  
for Communications*

Warwick Smith, Liberal Party Member for Bass in Tasmania, was appointed Shadow Minister for Communications in February, 1991. Since his entry to Federal Parliament in December 1984, he has served as Shadow Minister for Privatisation, Aboriginal Affairs and Science and Energy. Before entering Parliament he practised commercial law in Launceston where last month he spoke with Liz Fell.

**W**hat is the first thing the Coalition intends to do if it wins the election?

**Smith:** The very first thing is to determine the processes for privatisation of AOTC. As the line manager in charge of the entity that is to be privatised, I'll liaise closely with the person designated as responsible for that. The second major thing is to have a closer look at Austel's regulatory role with regard to the two competing licensees and other issues such as the Ombudsman. We also want to ensure that mobile competition proceeds quickly.

**AC:** Will you keep a separate Spectrum Management Authority?

**Smith:** I reserved our position on that in Parliament. We supported the Radcoms legislation because we felt it was going forward, but I have reservations about some aspects. We might have to make some decisions before it starts.

**AC:** Are you planning to create one regulatory body like the Federal Communications Commission [FCC] in the US with responsibility for telecoms and broadcasting and spectrum?

**Smith:** I've toyed with that, but I don't see it as something achievable immediately.

# The Coalition's Goals — Raising Money and Competition

**AC:** *Why not?*

**Smith:** Because I need to come to grips with where we are exactly, including the role of the Trade Practices Commission [TPC]. The problem of how to respond to converging technologies given you've got dedicated separate regulatory authorities is not one that I want to make on the run other than to say that I think the inevitable path is to merge the functions of those authorities.

**AC:** *The rhetoric of some members of your party suggests that they want to substitute general competition policy for industry specific regulation.*

**Smith:** Well, even under a broad umbrella approach, you'll still need industry-specific approaches. At least, that's the advice I've been receiving. So I don't see a jump to total competition policy.

**AC:** *What about the New Zealand model?*

**Smith:** We've got to be very careful. New Zealand is the size of the Sydney market. One of the lessons is that by making the courts the arbiter, this may have worked to slow down the emergence of competition.

**AC:** *Will you keep the present heads of Austel and the Australian Broadcasting Authority or pay them out?*

**Smith:** It's not our policy to close any of that out. I'm not saying we won't be reviewing how the regulatory structure might operate, but we have seen a change in the direction we want with each of the relevant Acts: The ABA has a stand-back regulatory regime, the Spectrum Management Agency is a market oriented mechanism and Austel has a clear competition function.

**AC:** *Why do you believe there is a need to privatise AOTC?*

**Smith:** In a philosophical sense, there is no reason why a Government needs to be in the business of business. Telecommunications is one of the biggest businesses, and the technology now provides the opportunity for other than monopoly service.

The second problem is the capital required to provide state-of-the-art technology which gives benefits such as better pricing regimes. That additional capital is not going

to be generated solely out of revenues, so we don't see why the public, institutions and others, shouldn't be shareholders. When businesses become private entities or listed public companies, they are subject to far greater discipline, accountability and scrutiny by the marketplace which helps to improve internal and external performance. Also, of course, we're seeing this as an emerging trend around the world. Probably, Australia is a little behind there.

**AC:** *Fightback! also talks about reducing the \$50 billion Commonwealth Government debt.*

**Smith:** There are great economic benefits if you reduce the debt because the debt servicing cost goes down.

**AC:** *Isn't the Commonwealth Government debt relatively low whereas private sector debt is high?*

**Smith:** Yes, but the debt represented as a percentage of our GDP is high by international standards.

**AC:** *The Commonwealth debt?*

**Smith:** The overall debt. If you're selling an asset, you should, if you have debt, use it to reduce debt first. That's the fundamental plank of our policy.

**AC:** *With privatisation, the Commonwealth loses about \$800 million from AOTC in dividends and interest. Fightback! says that the reduction in dividend receipts will be offset by an increase in company tax. How will company tax increase?*

**Smith:** It becomes a company that contributes tax.

**AC:** *But AOTC pays tax now. How will this tax increase when it is privatised?*

**Smith:** Because of the increasing value: It will be more profitable when fully commercialised. And private shareholders, who will get the benefit of the dividends, will be paying tax accordingly. So we'll get that as well as company tax.

**AC:** *Are you planning to sell the whole company or to break it up into smaller parcels such as regional operating companies?*

## Why not get the WHOLE story on networking?

Whether it's FDDI, OSI, ATM, ISDN, SNA, Frame Relay, Fastpac, Token Ring or 10Base-T, you need to be on top of the rapid changes now taking place in the communications industry.

In the pages of Australian Communications, every month the region's top communications journalists, leading industry figures, academics, professionals and industry experts bring you the latest news and analysis on the technical, political and management issues facing this dynamic industry.

The time to subscribe is NOW! with savings up to 20% off the newsstand price.

### SUBSCRIBE NOW

22 issues, two years, for \$96 (save 20%)  
 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AUSS.....

Bill my company Authorising signature.....

Charge my:  Amex  Diner's  Visa  Bankcard  Mastercard

No..... Expires.....

Name.....

Company.....

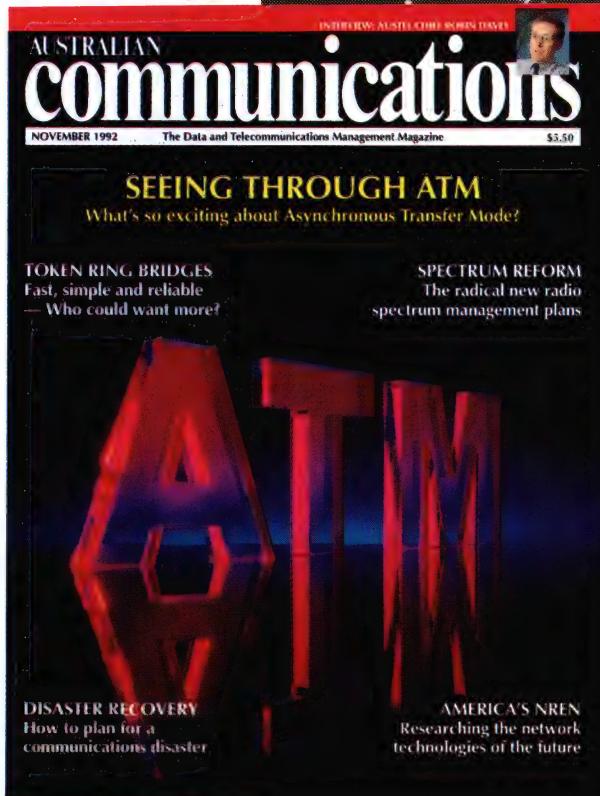
Address.....

..... Postcode.....

Signature.....

**Post to: Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000**

**OR: Fax your application to us on (02) 264 2244**



**Smith:** Well, we've had some fairly interesting debate on that issue, but I don't think it's 'real life.'

**AC:** So that break-up option has gone?

**Smith:** Yes.

**AC:** What do you expect to raise from the sale?

**Smith:** We take the view that over about a three year period it should be worth \$20 billion or in excess thereof.

**AC:** What about the higher figure of \$25 billion?

**Smith:** Yes, it could be up to \$25 billion. It's a very attractive asset for institutional investors. Telecommunications is not recession-proof, but in terms of growth areas in the general economy and in the region and world, it's regarded as the type of business to be in. Based on earnings projections, the growth in the market and the strong support available institutionally, domestically and internationally, for these types of stocks, we don't have any difficulty believing that we can get to that.

**AC:** Given the number of mooted telecoms privatisations around the world, isn't it a buyer's market right now?

**Smith:** There's a lot of telco stocks starting to come on, so we are going to be competing for support. For example, the second tranche of British Telecom will come on stream about the end of 1994.

**AC:** You must be hoping another tranche of Nippon Telegraph and Telephone [NTT] is not due at the same time?

**Smith:** While we all know that Australian Telecom has been over-engineered to blazes, we also know that it's a sound company that's got a 96-98% penetration into its market in terms of service provision to customers, both domestic and business. It is therefore a good aircraft carrier, for want of a better term, into the fastest growing economic region. As part of the Pacific circle of telco activity, it serves a very pivotal role, and therein lies a lot of its value which, of course, is hard to stick an actual value on.

**AC:** But you just have stuck a value on it! By contrast, Goldman Sachs valued it at \$12-14 billion several years ago.

**Smith:** They've been challenged on that. Firstly, that was done prior to the amalgamation and to the changes in management and structure which are extremely important in telecommunications. A lot of people felt the Goldman Sachs report was selling Telecom short. It specifically rejected in part an international role for the company. Based on the assumptions that applied at the time compared with the assumptions you might come up with now, many people believe Goldman Sachs would not come up with the same answer.



Interestingly, they came to see me recently and said that it's completely different now, though I suppose in a sense you'd expect them to say that. But to Ken Davidson and others who argue we should be looking at the Goldman Sachs report, I say they're falling into the trap that so many fall into in this area, that is, assessments that are 18 months old are made redundant by the speed with which things have been moving.

**AC:** Since Goldman Sachs we've seen a number of moves that could reduce AOTC's value such as low interconnection rates for Optus. Competition is beginning to take hold.

**Smith:** But competition is taking hold in a market that's growing. There is a lot of unsatisfied demand for telco services in this country and in this region, so both [carriers] will take a slice of this. Their market configurations will change, but because of the overall growth, our view is that Telecom may lose market share to other competitors, but its revenues will increase.

**AC:** Given your obvious interest is in maximising the price of AOTC, did it worry you when Austel determined there would be a preselection ballot?

**Smith:** Well, I did express some initial concern about the basis on which balloting was going to proceed because I thought it was going to be similar to the American system, but subsequently they refined it.

The balloting process is to be an adjunct to the development of real carrier competition — in other words, it's allowing customers to migrate to the competitor. Together with the favourable interconnection rates, that is part of trying to build real competition which will provide long-term benefits and pressure on prices. So I'm not overly concerned. I've talked to Telecom and they seem to be relaxed about it now they've come to an agreement. But I reserve the right to have a look at the agreement they've reached because it's a little hard at this distance to get all the details, and I want to look at what the balloting process does to other potential entrants because I haven't had the benefit of the advice the Government has received from Austel or the TPC or anyone else. Given our commit-

ment is to a competitive environment, does the whole balloting process deliver that? I hope it does; I suspect that it should.

**AC:** On the issue of privatisation, the *Fight-back!* document says that ANZ McCaughan has indicated Australian equity markets should absorb up to \$15 billion in equity raisings annually. Isn't that a very optimistic estimate?

**Smith:** Their assessment is basically of the total funds that might be available for investment per se. It is based on flow into superannuation funds and elsewhere, and on the unsatisfied demand in the Australian community for public offerings such as happened with the GIO [Government Insurance Office] where there was a great over-subscription. It is also based on what we saw in the UK with the ESOP [Employee Share Ownership Program] support.

**AC:** Yet I understand only about \$8 billion was floated on the Australian capital market between 1987 and 1989, and that is not the cash that was finally raised.

**Smith:** That was in a recession, and we're talking about different quality stocks. Something like Telecom has never been offered before and it is serving a market that has got a 3% compound growth or better. You're not investing in something that is reducing its utility to the community, so you've got to add a premium for that. What we're saying is that our first priority in the privatisation process is IPOs [Initial Public Offerings]. But as the process proceeds, if it's possible to add to the strategic value of Telecom in its services to the Australian community and its role in regional and global communications, then you marry in with an international telco.

**AC:** So the trade sale follows the Initial Public Offering?

**Smith:** Yes, we're primarily concerned with doing an IPO, though we could think about making soundings about a trade sale at the same time.

**AC:** Wasn't Qantas an initial trade sale?

**Smith:** Yes, Qantas went along the trade sale rather than the IPO route. But the same strategy underpins it because Qantas is a great asset, it's internationally recognised, needs additional capital and it also needs to link into a changing global aviation industry. The same is happening in telecommunications. We don't believe that Telecom is going to be a small, domestically focused telco because that's not 'real life.' So you can enhance the value of the share price by arrangements with a BellSouth or KDD or France Telecom.

**AC:** What feedback have you had so far from potential carrier investors?

**Smith:** A few wandered through during the original process such as Bell Atlantic, Ameritech, BT and others.

**AC:** What about since you announced plans to speed up the privatisation process?

**Smith:** Prior to Christmas there was a bit of interest from some of the Baby Bells.

**AC:** What about AT&T?

**Smith:** I think that sometimes their advisers come along and you're never quite sure who they're representing.

**AC:** How high would you let foreign investment go?

**Smith:** We believe that AOTC can be, and should be, majority Australian-owned. It's a strategic asset.

**AC:** What percentage would you allocate under an ESOP?

**Smith:** We're going to make an announcement about ESOPs before the election.

**AC:** What about a broad estimate?

**Smith:** I don't have comparable ESOP figures available, but I think you'll find that 2-3% of equity could be represented by ESOPs. We're talking about roughly 70,000 employees. There is the question of whether they will all take advantage of this, and retired employees may be able to take a position. We see that as being extremely important to motivate employees about the value of the work they do.

**AC:** Would you be seeking a 'golden share' for the Government?

**Smith:** Yes, we've talked about the 'Aussie share.' You determine what you want to achieve and then attach those conditions. That's been a feature of privatisations in this area worldwide.

**AC:** But 'golden share' conditions aren't necessarily permanent are they?

**Smith:** Well, if there are five telcos competing out there in 20 years, why should one be burdened with a particular requirement?

**AC:** Are you confident you have the right Board to take AOTC into privatisation?

**Smith:** When the Board was appointed, I indicated that I thought it would be necessary to review it. The lesson of privatisations around the world, particularly flagship privatisations such as this one is for Australia, is contingent upon the Board being capable of being committed to the process in a public and private way. I make no comment about individuals on the Board, but I would be wanting to look closely at it.

**AC:** That doesn't answer the question does it?

**Smith:** I'm only a country lawyer, you know!

**AC:** And I'm only a journalist stumbling over words. Is it correct to say you expect to make some changes to the Board?

**Smith:** Yes, I would expect to make some changes either by way of additions or by replacing some retirements.

**AC:** You were critical of the political nature of the Board when it was appointed. For example, is there a problem with the two IBM Directors or with a leading banker as the Chairman?

**Smith:** There is no room on the Board for any potential conflicts in the privatisation process. I have to say that in terms of Mr Hoare [the Chairman], I find him very experienced in telecommunications matters.

**AC:** But you've made no comment about the IBM contingent?

**Smith:** No, I don't think it's fair to comment on individuals. But I will make sure there are no conflicts of interest and they will all have to commit 100% to the privatisation process. If they can't, they should voluntarily depart.

*"There is a rather unique section in the Act which effectively tries to lock the duopoly in until 1997. . . We opposed that and gave notice that our vision was very different, so any purchasers ought to be on notice that a future Government would have a different view."*

**AC:** In terms of the senior communications bureaucrats, are you confident they can take the company into privatisation?

**Smith:** The Department will only have a peripheral role.

**AC:** Are you happy with the Department now? Do you have any dealings with the senior bureaucrats?

**Smith:** I've had a lot of dealings with the Department, primarily on Pay TV. We've been meeting once a month to try and chart what the next change will be! There are some good people there.

**AC:** So you're not planning a major overhaul at the top?

**Smith:** No, I feel very comfortable with them. Their advice has been pretty good, as far as I can see. I've been one of the only constant threads because they've had five Ministers on the other side! On all these major issues, I've been able to push and shove to move the process closer to the agenda I think is important for Australia.

**AC:** So ideologically you're not far apart from the Department?

**Smith:** Well, it might be damning of the Department to say that. But there would be some fellow travellers who recognise that the needs of Australia are such that there has to be well-managed change in this area which caters for all the competing interests.

**AC:** You were originally opposed to the duopoly...

**Smith:** So was the Prime Minister — when he was in his 'microeconomic reform mode.' Subsequently, he has started to deviate.

**AC:** Have you seen the Optus Deed of Sale?

**Smith:** All the terms of the agreement have not been made fully available to us. I want to review that because of the time-payment period and so on.

**AC:** So you would like to see that Deed?

**Smith:** My word, because the time-payment period might have an impact on the value they claim to have achieved.

**AC:** I understand it specifies the commercial damages that Optus could seek. Is that correct?

**Smith:** I would want to get to the bottom of all those issues. I've had some preliminary legal advice on the options available if we want to review the licensing arrangements and the duopoly, and what the consequences might be in terms of compensation or otherwise. There is a rather unique section in the Act which effectively tries to lock the duopoly in until 1997 for fear of massive compensation. We opposed that and gave notice that our vision was very different, so any purchasers ought to be on notice that a future Government would have a different view. Whether there would be additional licensees as part of our commitment to competition would depend on a range of things, not the least of which will be the state of the market and the push for additional licensees.

**AC:** Given the tensions between privatisation and competition, surely you wouldn't want more competitors before the sale?

**Smith:** Yes, the tension is always there, but competition is our underlying policy thrust. That's what we want to achieve, and privatisation has got to be compatible with that.

**AC:** Still on the Sales Deed, do you know whether there is any undertaking on selling AOTC? After all, Mayne Nickless is still planning to sell part of its stake in Optus.

**Smith:** There is no undertaking from us. There is some speculation the Labor Government has made its own enquiries about privatisation, but I can't get to the truth of it.

**AC:** Did John Hewson give any letter of undertaking to Optus?

**Smith:** Not that I know of.

**AC:** You've not heard that before?

**Smith:** No undertakings — I know because I would have been asked to draft a letter.

**AC:** So is it correct to say that the Coalition has made no promises to Optus about the duopoly or AOTC sale?

**Smith:** We've said to Optus that if we change the policy, we will do it in consultation with

# AN INTERNATIONAL PABX SUCCESS HAS JUST GONE NATIONAL.



NorTel's world acclaimed Meridian PABX systems are now available across Australia through Exicom . . . thanks to an expanding partnership between these two telecommunications leaders.

Meridian, already helping business in New South Wales and Victoria, is capable of handling from 50 to 10,000 lines and offers networking, voice mail and automatic call distribution.

This sophisticated telephone system can be tailor-made to suit the differing needs of many industries . . . including

finance, hospitality, healthcare and travel.

And you can always be assured that NorTel's world class technology is backed up by Exicom's top quality service.

This partnership further expands the scope of NorTel's commitment to Australia and puts Meridian PABX systems within your reach.

For more information call Exicom today in Sydney (02) 748 7977, Melbourne (03) 574 4200, Brisbane (07) 252 4222, Adelaide (08) 362 3777, Perth (09) 353 3699, Canberra (06) 239 1333.

**EXICOM**

**nt** nortel

© 1993 Northern Telecom. Meridian is a trademark of Northern Telecom.

you, but we're not going to give any 'under the table' undertakings; it's not appropriate. We generally know what's in the sales documentation, because part is in the Act and then there are the licence conditions.

**AC:** *But is the Deed of Sale identical to the section 70 licence conditions?*

**Smith:** It might well need to be reviewed and tested to see whether it is legal.

**AC:** *Will you make the Deed public?*

**Smith:** I don't see any reason why I should not, though I expect Optus would be making representations to the effect that it's commercially sensitive. Being versed in the needs of market confidentiality, I would, of course, take account of this.

**AC:** *You have earned a reputation as someone who has talked and listened to a wide cross section of the industry.*

**Smith:** Yes, I like to put down my views and have people test them.

**AC:** *What backup support have you got?*

**Smith:** There is myself and my researcher, Vivienne Shield. In Opposition, you soon learn that you have to carry your own bag and write your own briefs. That imposes a discipline on you to address the fundamental

issues rather than get caught up in chasing an agenda that leads nowhere.

**AC:** *What are the telecoms issues that concern your constituents?*

**Smith:** I think most people are happy with Telecom's performance. One big issue that many people wouldn't realise is that Tasmania relies totally on microwaves for telecommunications out of the State.

**AC:** *Yet the early Tasmania-mainland cable was actually the second submarine cable in the world.*

**Smith:** That's right, but now we rely on microwaves. In my view, that's a problem that will have to be addressed very, very soon.

**AC:** *Should it be addressed before the privatisation of AOTC?*

**Smith:** Concurrent and at the same time! The umbilical cord between Tasmania and the mainland is fundamentally important!

**AC:** *Are you suggesting AOTC has forgotten Tasmania?*

**Smith:** There has been enough capacity until now, but with greater demand for data links and other services, we can't continue to rely on the microwave system. There are limits to its capacity. I would see it as important to ad-

dress that and make the capital commitment.

**AC:** *And satellite delivered Pay TV to Tasmanian homes won't necessarily be delivered either?*

**Smith:** Even with the full national satellite footprint, they won't commit to providing it here. The anointing of the satellite as the sole deliverer of Pay TV is wrong for this area.

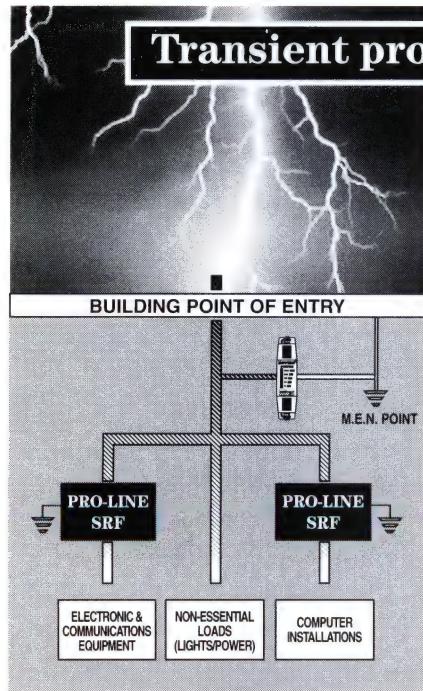
**AC:** *The need for satellite customers has been a major determinant of broadcasting policy. Has this changed under Optus?*

**Smith:** Yes, the whole policy has been driven by the mistaken belief that we have to somehow recoup the satellite losses. Now they are saying that Optus can recoup them from the public by anointing the satellite in preference to other technologies. That delivers a disadvantage to areas such as this by denying the opportunity to pursue other hybrid solutions such as optical fibre/microwave distribution.

**AC:** *That statement won't endear you to Optus.*

**Smith:** I notice they're coming to see me shortly.

*Liz Fell is a freelance journalist and Senior Research Fellow at CIRCI.*



**CRITEC**

**Fax 002 730399 Phone 002 730066**

Critec Pty Ltd Box 536 GPO Hobart 7001 TAS  
NSW (02) 688 4528 VIC (03) 696 1633 ACT (06) 257 3055  
QLD (07) 849 5077 SA (08) 289 1339 NT (089) 41 3880  
WA (09) 257 1065 NZ (09) 309 2464

A direct lightning strike can have peak currents approaching 150,000 Amperes. Modern computing and communications installations are highly susceptible to these impulses if coupled onto mains reticulation systems.

It is this energy, together with the fast voltage waveform of the lightning impulse which gives rise to equipment damage and possible loss of life. The cost of damage to capital equipment can be large but the hidden costs incurred by loss of operations and services are often far greater.

Today, the question is not whether to protect sensitive electronic equipment rather the selection of the correct protection system to prevent power transients from entering an installation.

Critec Pty Ltd, Australia's leader in transient protection, would like to offer you a paper on powerline protection at the building point-of-entry. Analysing the effectiveness of Surge Reduction Filters and new technology shunt diversion techniques to attain a superior protection solution, this paper will allow you to make operational decisions on the planning, selection and installation of the correct protection system as recommended in the new Australian Standard ASI768-1991. Simply fax back this page to 002 73 0399, or send in the coupon below.

**Yes.** Please send me your Publication Note CRPN 13 "Proline SRF Application Note".

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ POSTCODE \_\_\_\_\_ PHONE \_\_\_\_\_ FAX \_\_\_\_\_

# Suitable for production and lab



The OMS-100 is the first fiber optics measurement system uniting precise lab test technology with the ease of use required in production testing.

- ★ Optical test system with three slots for sources, power meters and attenuators
- ★ Auto-configuration for any combination of modules
- ★ Large EL-display shows all instrument settings and results at a glance
- ★ Automatic dark-current compensation without disconnecting device under test
- ★ Integral optical filter for selective level measurements
- ★ Wavelength Division Multiplex measurements (WDM)

- ★ Coupled measurement functions between modules
- ★ Extensive result processing for trend analysis in production testing of optical components and systems.
- ★ Universal, easily exchanged test adapter system
- ★ Remote control of all functions by IEEE 488.2/ IEC 625.2

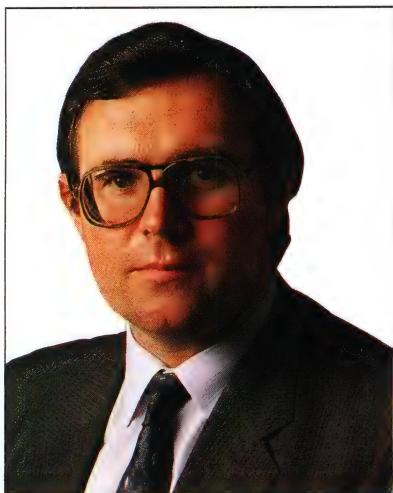
The OMS-100 system is a modular concept. You can configure it according to your requirements. The system is easy to operate and future-proof. Ask for more information about the OMS-100 Optical Measuring System.

Wandel & Goltermann Pty Ltd  
PO Box 419  
World Trade Centre  
MELBOURNE VIC 3005  
Phone: (03) 6 90 67 00, Fax: (03) 6 90 67 50

**Wandel & Goltermann**

Electronic Measurement Technology





**Tom Amos**

## Cell Off

With the announcement of one more national licence for the provision of mobile cellular telephones in Australia came the news of an extension in operating time for the existing analogue network for at least another three years, until the end of the century. While it seemed a small change at the time, the ramifications are great. Good news for the current monopoly providers, maybe good news for the user, but definitely bad news for the now two new entrants, and Telecom has yet again benefited from a change in the apparent ground rules.

The chequered past of mobile telephones in Australia is littered with poor decisions, disregard for the rules and poor spectrum utilisation. With the extension decision, the past continues on and there is now a real chance that the need for a new digital network and services was very academic and definitely premature.

From the beginning, there has been a vast shift from the simple policy to implementation of radio mobile networks. Telecom opposed mobile telephones in the early 1980's, bought a proprietary system under pressure to commence a premium service, was a late entrant into true wide area mobile phones, and then squatted on the reserved spectrum of a potential second competitive operator — in effect forcing the opening of new radio bands and the potentially punitive early introduction of new digital technology in a country that was lagging by several years compared to the rest of the world in current technology implementation.

Poor timing and policy in this area has really been post event rationalisation and adjustment of policy to match the actions. In most cases the policy has followed dutifully well after the physical implementation. The result, of course, is that Australia now potentially uses more spectrum to provide inefficient mobile services than countries even 10 times the population size. On a per population basis, there must be more hertz per head for mobile telephones in Australia committed now than anywhere else in the world. This in turn limits the legitimate spectrum available to other users.

Cellular mobile has been a success story, despite the poor planning and growth limitations. With almost 600,000 users it is, in telecommunications terms, an overnight billion dollar business. With the introduction of resale of the Telecom monopoly capacity by the second operator, Optus, rapid stimulation of the market has occurred.

It still amazes me that within 12 months Optus has snared almost 15% of the total mobile business. Talk about suppressed demand! Growth of services is continuing at many thousands per week, so by the end of the century, well over 20% of the total telephone population will be mobile, using current trends. Whether the sales are penetration, price or service sensitive will only be determined with the introduction of other services. The stakes are high.

Now this is all well and good whilst Telecom is the backbone network supplier, but it was intended that there be multiple network suppliers, competing in a marketplace for both the new and repeat business. In theory, at least this would mean some sharing of user base and a more even distribution of customers across the new digital spectrum. In fact, three strong networks were predicted by the end

of the century. This open approach was adopted by Austel in recommending a switch to digital GSM but clearly, it was not embraced by the Government with the decision to extend the time of the analogue service after the GSM decision.

Maybe this means that the digital providers will be competing with an analogue system that has a sunk low cost structure, is well extended to cover most of Australia and has very low handset costs. Digital features can also readily be incorporated in analogue handsets.

The current trend for mobile cellular infrastructure indicates that even by 1995 the superior digital systems will have a user basic cost structure over double that of any revamped analogue functional equivalent. What chance then does a digital cellular provider have to sell against a lower cost structure? Better performance and some features, but in the end it all comes down to a few features and a small price. Just like the full features of a PABX, few actually use them and only a small percentage demand anything other than the basic functionality.

Does the several hundred million dollars that is to be invested in the digital networks have a solid basis? Telecom and Austel apparently think not. Telecom is now actively promoting a new format for digital cellular, one compatible with the existing radio services whilst Austel moved quickly from a very pro-GSM digital stance to a technology neutral stance for the third licence.

Thus, given the history of the services one would have trouble not backing at least one more post event change . . . this time to enshrine the analogue spectrum as Telecom's forever and the introduction of a compatible technology to 'optimise the return' of the existing investment. It appears that most other decisions have been made on this basis so at least it would be consistent. As for the other operators, they can compete for a slice of the small high feature and performance mobile digital services market with Telecom as the third corner of the contest . . . or they can keep on reselling the Telecom-provided capacity on a marginal basis.

By whatever means, only forcible removal of the analogue mobile service provider will ensure that a true market develops and that competition will deliver a better service — the original plan. But the price — well that's going to rise unless Telecom continues to get its way as the post event actions of the past have far reaching impacts on the future of mobile communications well into the next century.

The user has again been sold short. The current system has a capital pay back for the operator of less than 12 months per new service. Great business. Little discounts on air time will be the only small relief as no other operator can attack the indirectly protected cost structure. New digital services will have a long way to go from the lower the price we pay to a single network monopoly and may never be able to do so until the next century. Meanwhile, all the cell users continue to pay non cost-related, inflated prices as the price for less than optimum introduction of competition. What a cell off!

*Tom Amos is a partner with telecommunications consulting engineers Amos Aked Swift.*



**Alex Gosman**

# Focusing on the Future

This year will be one of continuing change for the telecommunications industry in Australia with the introduction of the third mobile carrier, the advent of new technology and the forthcoming Federal Election. Regardless of the outcome, major Ministerial changes in vital areas will impact on telecommunications.

The Australian telecommunications industry has achieved increasing international prominence with rapidly expanding exports of services and equipment, particularly in the Asian region. An environment of certainty and support has been critical for the development of the industry.

In looking at the increasingly complex policy environment, the question is whether the Government is prepared to take a long term approach that provides the incentives and encouragement for the further development of the industry. The alternative is a series of measures (often politically expedient) that will hamper the industry's growth. Australia possesses considerable strengths in the telecommunications industry, not only in the capabilities of the carriers, but in the depth and competitiveness of the supporting telecommunications/electronics equipment industry. The Australian electronics industry has enormous potential through the growth in local production and exports to contribute significantly to reducing the existing balance of payments deficit and unemployment.

Yet, there remains a disappointing lack of recognition in many quarters of the strategic importance of telecommunications to Australia's future and the opportunities that, for example, an innovative, competitive AOTC offers to Australia's participation in the world's largest industry. Telecommunications is a vital input to other sectors of the economy and the telecommunications services and equipment industries also are of vital importance in terms of export income achieved and import replacement.

The prevailing Canberra view of 'competition for the sake of competition' pays little attention to the strategic importance of telecommunications. Some of those with the economic rationalist views seem to be mesmerised by the concepts of the level-playing fields that fail to understand an industry as complex and inter-related as telecommunications.

An obvious key issue confronting the Government is that of the ownership of AOTC. Of pressing importance is the ability of AOTC to have access to a capital base that provides the funds for investment in network modernisation and enables it to compete effectively both domestically and internationally. Consideration of privatisation should not however be a dash for cash, with seemingly little, if any, appreciation of the strategic importance of AOTC. To hand control of the major carrier offshore would be to diminish Australia's national security and opportunities for active, rather than peripheral, participation in the global industry. For these reasons, ownership and control of AOTC must be retained within Australia, with any overseas investor restricted to a maximum holding of 5%.

The future of the Telecommunications Industry Development Authority (TIDA) is of utmost importance to the industry. In addition to its monitoring functions of carrier and industry performance,

TIDA appears to be one of the few participants in the telecommunications industry attempting to come to grips with the various issues impacting on the industry and the implications for policy development. As such, it appears to have been criticised by some within Canberra who prefer policy development to be conducted in an atmosphere of secrecy. AEEMA strongly supports the approach taken by the Authority to actively interface with the industry. Sound policy making must rest on being informed and in this respect TIDA is playing an invaluable role.

In 1993, major decisions will need to be made in the area of standards. Standards will shape the future telecommunications environments as we move to two and then three networks with varying degrees of interconnection. It is important that bodies such as Austel and DOTAC recognise the need for networks that are compatible. For example, the adoption of multiple standards for a common service goes against the trend in Australia, and the rest of the world, towards common standards, yet offers no apparent benefit to the telecommunications users. The increased costs are borne by users and the manufacturing industry.

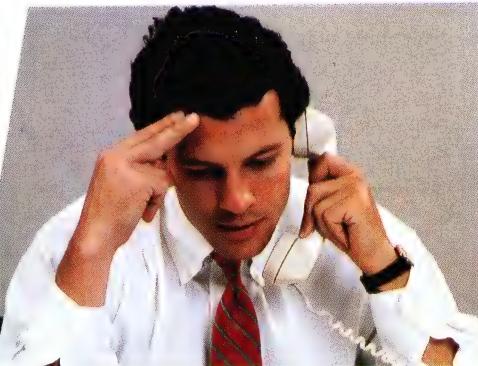
One recent example of sensible policy development that takes into account the views of industry is the establishment of the Telecommunications Export Task Force — an industry/government approach designed to promote increased exports. The Task Force provides the opportunity for industry to have input directly to Government on factors influencing exports and as such complements AEEMA's own Telecommunications Export Development Group (which comprises representatives of the equipment industry, carriers and Austrade). Appointing an industry representative as Chairman indicates a willingness by government to join with industry in addressing issues together.

The Government needs to focus on measures that will enhance Australia's competitive future in high-tech industries. At the end of the day, close relationships between the leading edge service providers in AOTC and Optus and their Australian equipment suppliers are crucial to developing a long term partnership for mutual growth and an international outlook. Underpinning such relationships should be incentives such as investment allowances for plant modernisation and expansion and targeted taxation concessions for income derived from exports (such as providing taxation concessions for Regional Headquarters locating in Australia). Australia is competing internationally for investment and therefore the Australian investment climate must be globally competitive.

The Australian telecommunications industry is showing that it can compete in a global environment on its own efforts, by building on Australian ingenuity and skills. Supported by a positive government approach, the Australian telecommunications industry can provide the national benefits on jobs and income that were fortified in industries such as computing by policy neglect and a short-term focus.

*Alex Gosman is Executive Director of the Australian Electrical and Electronic Manufacturers' Association (AEEMA).*

# **IT'S HARD TO GET A PHONE CONNECTED WITHOUT GOING THROUGH JNA.**



Telecom's customer service is really switched on with the help of network communications technology from JNA.

This technology, integrated with Telecom's AUSTPAC service, forms what is arguably Australia's largest OSI network. Operators throughout Australia now field all kinds of customer enquiries from a single desktop PC, accessing and exchanging data from three different computer systems - IBM, Honeywell and Digital.

Previously, three separate terminals would have been needed to do the same job.

JNA's Network Integration knowledge is at the forefront of today's climate of open environment computing. JNA's engineers are the quiet achievers assisting Australian industry for over 30 years.

If your needs are to distribute the computing power of your organisation, a phone call to JNA could have you well connected.

Sydney 417 6177 Melbourne 532 8555 Canberra 248 5422  
Brisbane 870 3434 Perth 481 4034 Adelaide 338 2511 Darwin 81 1499



# A Welter of Wired-Up Predictions

Pushing fibre optic cabling out to every subscriber's home and office will require massive expenditure. Stewart Fist examines the requirements and some proposed fibre-to-the-home schemes.

**L**et's face it; futurology is fun! Technological predictions make great copy for journalists and they're stock-in-trade for public relations folks. Within months of the Wright Brothers success at Kittyhawk, dozens of prophets were predicting that everyone would soon have a flying machine parked in the backyard. And remember the 1950s auto-gyro/automobile? When confronted with a traffic jam, we'd all unfold our rotor-blades, hop into the air and be downtown in minutes.

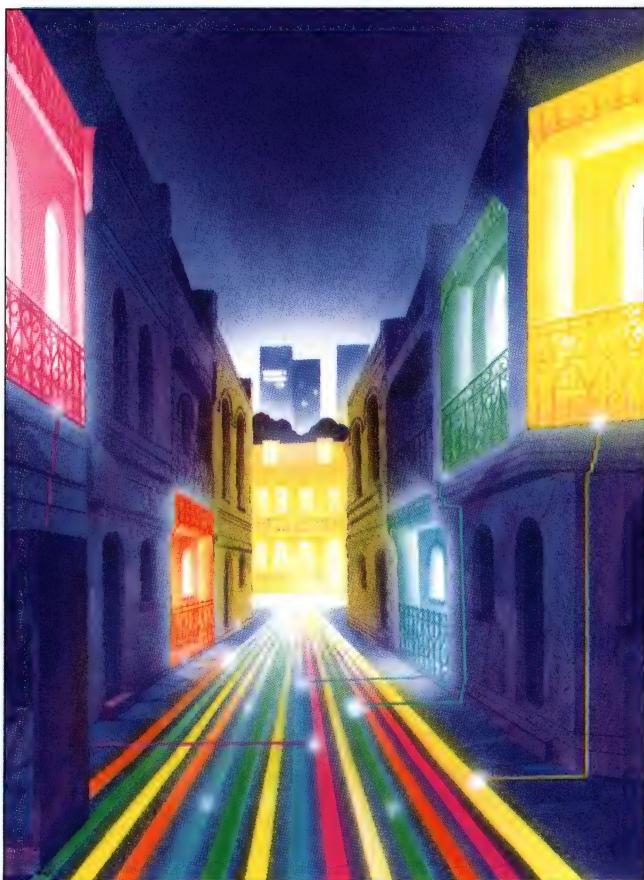
The shared defence for all failed predictions is that they seemed, like streaking, to be 'a good idea at the time.' Most result from 'scientific' (but never-ending) extrapolation of trend-lines — on the mistaken assumption that changes which are important now will continue and accelerate in the future. But you can't treat the world as a simple, understandable, uncomplicated linear system, narrowly defined only by the technologies of the moment.

Take fibre-to-the-home (FTTH). It is quite obvious to us today that 21st Century homes will need 200 channels of cable-delivered television, interactive educational and information services, home shopping and banking, centralised security systems, home-printed electronic newspapers, and the host of other promised services. The economic and technical trend of new national and international telecommunications networks are all being based on these assumptions. But seduction can be a more insidious challenge to our intelligence than confrontation, and a fibre-wired suburbia is nothing more than the technophile's dream of paradise. Probably the only home service not yet included in the menu of promises is 10 second delivery of pizza! I guess the mozzarella keeps sticking to the glass.

Corning Glass Works invented the glass fibre in 1970 and it seems that Telecom has been hard at it predicting FTTH next year, every year since. The silverfish got into my earlier records, but I've still got an inch-thick file of generalised predictions ('fibre is coming soon . . .') dating back to June 1981.

The main change over the years has been a hardening-up on dates, and, since Aussat's satellites first began to pose a threat to the telephone monopoly, Telecom has been even more specific with 'fibre will reach 80% of Australian homes by 1992' or '60% of homes by 1993' or, more recently, 'within reach of 60% of homes by 1994.'

These dates, percentages and distances seem to be chosen by the well known dart-in-the-calendar method. But for the record, David Pitt, AOTC's Group General Manager for Strategy, said at last year's Senate Pay TV Inquiry that "by 1994, optical fibre will be within 700 metres of 60% of homes in all capital cities except for Hobart and Darwin." It's official — it's in Hansard! The current figure is 20% of homes, according to Pitt.



## Fibre Serving Area

Pitt was referring to Telecom's 'Fibre Serving Area' (FSA) project. Fibre cables will radiate out from exchanges to what amounts to a sub-station in suburban streets. Each of these will then service about 500 nearby homes using either coaxial, glass fibre or hybrid glass/coax delivery for the last half-kilometre. As I've pointed out in the past, 'within 700 metres' means an average of 500 metres still to go

## The Contenders: Old and New

There are several schemes now being considered or even actively trialled which are designed to deliver high speed communications to home/office locations.

### CURRENT COAXIAL CABLE SYSTEMS

Typical American cable systems are one-way analogue networks carrying up to 54 channels of NTSC television using FM carriers. Signals originate from the 'headend' or hub. This is the cable station which may be generating some programmes itself, receiving others by trunk connections or microwave, or taking feeds from terrestrial broadcasting and satellite antenna systems.

An average headend in the US serves between 20,000 and 80,000 homes using a tree-and-branch architecture of coaxial strung along street pole or passed through ducting. The high loss of the cable means that trunk amplifiers are needed at regular intervals — about every 600 metres. Noise and distortion through more than 30 amplifiers in a chain defines the limits of the network.

Bridge amplifiers (not in the main trunk) provide the signal levels needed in the local secondary distribution lines, and these lines are then tapped to feed groups of 2-8 subscribing homes. The raw cost for

these systems, per household 'passed' (not including the connection) is about US\$50.

### RAYNET'S LOC

Raynet's LOC (Loop Optical Carrier) uses radiating pairs of fibres from a highly computerised exchange. Up to 4 kilometres of cable can extend from the hub, and up to 24 subscriber interface units (in active pillars) can exist along a single cable length. Each pillar then provides telephone, video and data services for eight subscribers over individual copper-coax drop cables.

There are six fibres in each cable: One pair for voice, one pair for data and two fibres for video. A single cable can service a total of 192 subscribers for telephony and '80 channels of video will be added later,' Raynet promised in 1988. By 1990, practical field trials were only handling 18 FM channels, but the system was to be modified to handle AM video distribution.

Raynet says that it intends to provide only the most popular cable TV channels over a LOC system as a matter of course, and leave some bandwidth open for a 'view-on-demand' service.

### AT&T'S STAR

AT&T also developed a FTTC system in 1988 which is very similar to the Raynet

idea, but it used a triple 'traditional' star architecture which allows four (later eight) subscribers to share the curbside electronics. It too, has copper drops to the individual homes.

This is now widely known as a 'cluster' system, and a number of the American RBOCs have been experimenting with this approach. AT&T maintain that their star-based network is slightly more expensive at the telephony-only stage than Raynet, but is cheaper to up-grade to video.

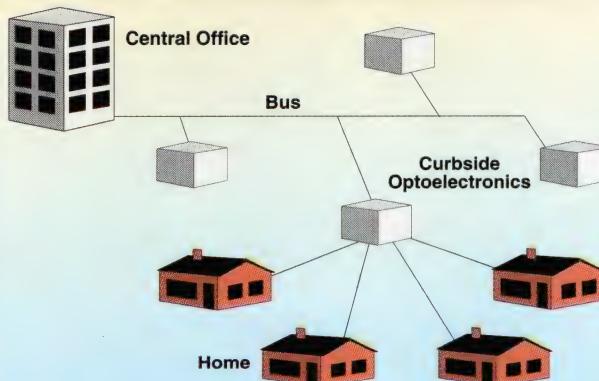
Most of the trials to date have been for telephony-only services, although many of these are now being upgraded to carry video since a recent US Court ruling allowing open competition in cable services.

### TELECOM'S MACNET

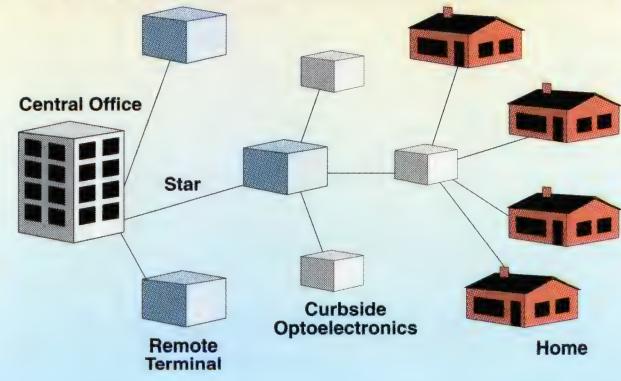
Most current work in Europe and Australia has centred on the use of passive splitting of signals down optical fibres, so that a single distribution fibre can feed between 8 and 64 households. Now discarded, and only included here for historical interest, Telecom's Macnet was of this design.

It was proposed as a time-divided narrow-band service (data services, news services, and hi-fi music) with a later upgrading to ISDN and broadband services (B-ISDN, cable and pay television, interactive

#### Raynet LOC Architecture



#### AT&T Star Architecture



— and this is for around four million Australian households (see 'Lies, Distortions and Pay TV,' *Australian Communications*, July 1992). So just to get this 60% figure connected up to the glass feeder pipe means another 1.65 million kilometres of suburban cabling, and to take the number up to the 80% mark probably means at least the same amount again.

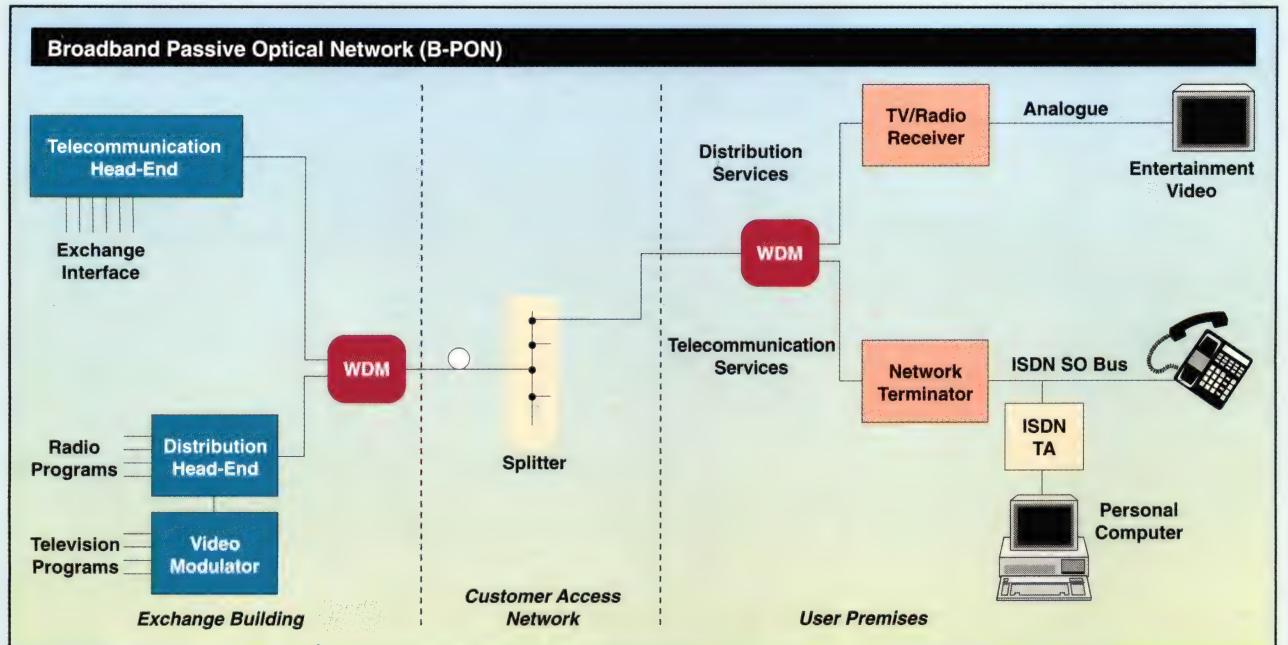
What's more, there doesn't seem to be anything yet glued onto the ends of the current 20% (approximately 2,400) of FSA fibres. The major suppliers of opto-electronics equipment tell me that there's no sign

yet of large-scale purchases of multiplexers, and I can't see any evidence of Telecom frantically building these FSA sub-stations in the suburbs.

According to Telecom insiders, they will use SDH (Synchronous Digital Hierarchy) multiplexing in the main FSA distribution network. Since FSA substations will house multiplexers, ancillary electronics, power supplies and junction boards, they'll probably be the size of a large toilet, and be either buried in the ground or equipped with air-conditioning in order to maintain a functional environment.

The job of trenching, ducting and cabling from the FSAs to a few million homes, and then providing electronic home equipment to make the system work, is not exactly a trivial task either. This doesn't sound like 'imminent' to me. Still, it may be the way for the Government to create work for a million or so unemployed for a few years.

Optus Communications, which has complex vested interests in this matter (it owns the satellites, but needs fibre also) say that we can reasonably expect 80% of Australian homes to have some sort of fibre connection about the year 2010.



video and high speed data). The plan was to use Wavelength Division Multiplexing (different lasers operating in different parts of the spectrum) with a separate optical wavelength reserved for each of the 16 customers to preserve privacy after the passive splitting of the signal. Data encryption would also be available.

Macnet was to supply a total of 20 160Kbps individual channels and one broadcast 2.4Gbps channel. The broadcast and interactive services carried over one single-mode fibre from the exchange (or FSA sub-exchange) to the passive pillar, and individual single-mode fibres would then act as drop-cables to 16 homes.

Originally developed by Alcatel under contract to Telecom, the idea was abandoned after experiencing 'non-trivial problems,' according to one source.

#### T-PON AND B-PON

T-PON (Telephony over a Passive Optical Network) and the broadband version called B-PON, are the current FTTH flavours of

the month. T-PON uses a tree-and-branch architecture and Time Division Multiple Access (TDMA) to handle telephony services and low-speed data to between 8 and 32 homes per feed fibre.

Currently there appear to be three versions of the basic T-PON network:

- Home T-PON with a single connection and fibre right to the house;
- Business T-PON with multiple connections, used as a replacement for 2Mbit services; and
- Street T-PON which is Business T-PON, but in a street pillar. It uses copper pair for the final drop to small businesses and blocks of flats.

In the Australian context, all these passive-splitting sub-networks will most probably be fed from FSA 'active' substations — with T-PON's two progressive passive splitters (Stage One with four splits, then Stage Two with eight) over the last half-kilometre feeding 32 households.

The upgraded version of T-PON is called B-PON, and is able to handle 18 chan-

nels of analogue video, and another version is being developed for compressed digital television. B-PON makes use of Wavelength Division Multiplexing to separate the interactive telephony and data services (ISDN) from the broadcast video services. They are also experimenting with AM video modulation.

#### BROADBAND INTEGRATED DIGITAL STAR

BIDS is a fibre-to-the-home network topology and technology which relies on active opto-electronic switching equipment in local street pillars. Both broadcast and interactive signals are multiplexed (TDM/TDMA) from the exchange to these pillar/sub-exchanges, and each then provides a separate fibre feed to 32 homes, with four channels for each — one digital data/telephone, two TV channels and a control. BIDS appears to be the only system which seeks to put switches in street pillars — the others all rely on multiplexing. It is included in the UK Bishops Stortford trials. **Stewart Fist**

This is roughly in line with other overseas estimates (Japan 2010, Europe 2015, USA 2020). Optus part-owner, BellSouth, has its own plans for an all-fibre network in native southern RBOC territory, which will be 'in place as soon as 2010.'

From late 1992, the US carriers are now able to compete in cable TV and security-systems markets, and if their new multi-purpose fibre systems are cost-competitive with the cable TV video-only feeds, then it shouldn't be long before the telcos take over. But the situation isn't necessarily the same in Australia.

For historical reasons, more than half the American households are already conditioned to paying for what Australians consider to be 'free' TV. And the profits to be made from cable TV in the US are immense. For instance, in 1988, a cable TV company with 525,000 subscribers was sold for a price equal to US\$2,500 per subscriber!

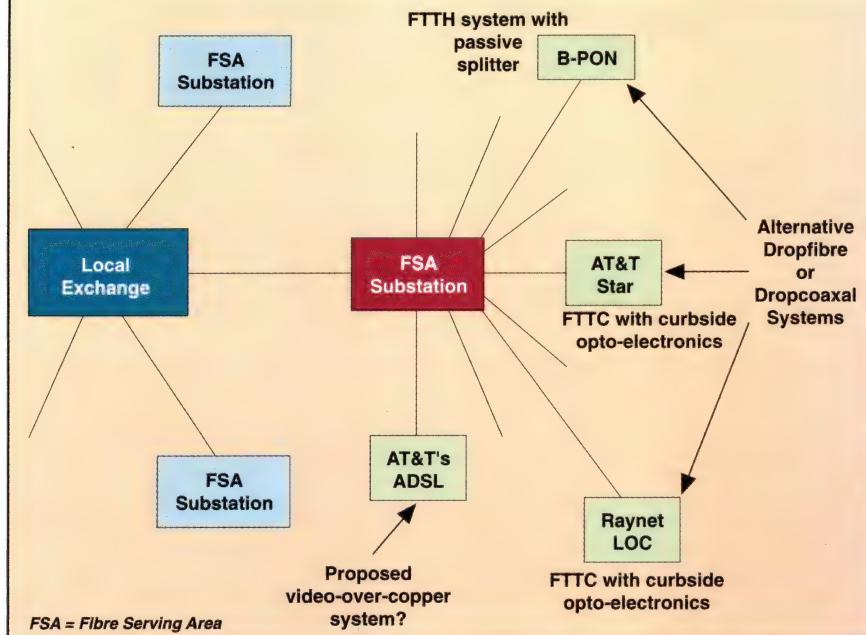
The questions facing Australia are not 'if' we will get a cable system, but 'how, when and at what cost?' And will cable television use the same system as the telephone? Like war, this decision is too important to leave to the Generals.

Fibre-to-the-home must be a considered national project, analogous to totally rebuilding the nation's rail system: Renewing all the rails, sleepers, stations and shunting yards, and replacing all the rolling stock. We need to be confident that the expenditure is justified, the standards are acceptable, and the timing is right — from the national perspective, not from Telecom's.

Telecom's monopoly of the Customer Access Network (CAN) is the feed to all future carriers and all future service providers. And since the CAN represents about half the nation's \$20 billion capital invest-

## Some Options for Telecom

This is probably the architecture of the Australian network as planned at present, with the main possible contenders for the last-mile FTTH or FTTC (or new video-over-copper).



ment in telecommunications, FTTH must remain a political and economic decision, not a technical one. The politicians can only make this judgement if they are receiving good and trustworthy advice.

The problem is that Telecom seems as confused as the rest of us — which wouldn't be a problem if it didn't control the purse strings. One minute MACNET is the way to go, the next minute it's trialling Lasercast and Laserlink in Wollongong and talking about T-PON and video-over-copper.

Each of these fashions-of-the-moment are trotted out in turn to explain why optical fibre is about to revolutionise the world — and why Telecom has the right to see itself as the sunrise industry in the Age of Information. There's a whiff of snake-oil salesmanship in the air — 'Whatever your ailment, we have a cure!' What is wrong here is the constantly vocalised claims that the FTTH problem is virtually solved. That Telecom needs only a political decision to proceed. That introduction is imminent.

Telecommunications is an industry that rides the back of the waves of technological change, rather than the front. International standardisation, reliability issues and capital cost considerations mean that the primary carriers can only afford to deal in reasonably mature technologies with proven value and known costs.

Telcos aren't supposed to be like computer companies, constantly dabbling in pie-in-the-sky technologies, so any changes in direction will take the best part of a decade to implement — they won't and don't happen overnight. These technologies require policy changes which should be announced

through Board decisions rather than PR handouts. FTTH decisions will effect millions of households and businesses apart from the Australian electronics industry.

When told at the Pay TV Inquiry that the fibre delivery of television was a valid alternative to the Optus satellite, Inquiry Chairman, Senator Chris Schacht, asked, "Has the Board of Telecom approved [the increased investment]? Has it said [say] that fibre-to-the-home is expected to prove generally economic for new installations by 1995-97? Has that been approved by the Board? Is it going to go ahead? And have the borrowings been arranged?" His questions were right on the mark.

But if Telecom's Board has a clear and well calculated idea of costs for these systems, it chooses not to share the information with politicians, bureaucrats and the public — although their executive staff often throw out a smattering of information, just to whet our appetite.

For instance, at the Pay TV Inquiry, Telecom estimated '\$400-\$800' as the expected cost for 'opto-electronic gear' in a FTTH system — a statement that bought Senator Schacht out with guns blazing. "This is the first time that I have finally got a figure out of Telecom on an optical fibre connection," he said. "This is startling news, I have to say, because I've been asking this question out of my interest in the area for five years, and I've never got a figure."

Unfortunately, the Telecom executive's guesstimates of 'opto-electronic gear' does not seem to be related to any specific fibre-linking technology — and it was widely (and incorrectly) interpreted by Inquiry commit-

tee members to be the total cost of installing the whole functional network: Fibre, ducting, exchange gear and all. It clearly wasn't.

We are entitled to ask: What type of system? Are we talking about analogue or digital? Are the costs amortised over five years, or 50? Is this just an interim fibre technology which will cost us more later?

The '\$400 to \$800' estimate could just be for video decompression chips added to the home TV, for an analogue AM tuner, or their estimation of cost for a gigabit-per-second home demultiplexer capable of handling 100 channels of HDTV delivered en masse? Currently these are worth about \$65,000.

We've long been told by Telecom that the all-up cost of Australia-wide suburban fibre will be \$9 billion — but, is this for the FSA shared-feeder approach with a few channels of analogue video, or for a star-network using B-ISDN protocols? And is it for the glass fibre only, or does it include the home and exchange electronics? Who can say? Only Telecom, but it isn't telling.

In the US, there are various quoted figures between \$US100 and \$US400 billion to fibre up the nation to the 80% level, so this might give us some idea what to expect. On a pro-rata basis, the US estimates translate to about \$A15 to \$A60 billion for Australia. But no one specifies what is included in the US figures either.

International comparisons are probably only valid when they aren't being made by like-minded monopolies facing almost identical future problems. In telecommunications you'd be excused for believing that they'd all been cloned from the same fibre-like filament of DNA.

## Broadband ISDN

Until recently, most of us assumed that fibre-to-the-home meant Broadband ISDN (B-ISDN) with a star network of individual glass fibres radiating out from the exchange. This is still widely seen as the network of the future, but to date, no-one seems able to demonstrate any overwhelming requirement for data-rates of 155Mbps (upstream) and 620Mbps (downstream).

In July 1992, Japan's Masashi Kojima (President of recently-privatised NTT) said: "I've changed my view with respect to Broadband ISDN. We will have difficulty implementing it as a basic service, and we [NTT] don't have sufficient strength to install optical fibre to all Japanese households. So we will need to position B-ISDN as a high-level communications service initially for larger enterprises."

This is all rather disturbing when you consider the source — the world's richest telecommunications company in the world's easiest-to-cable nation.

If you look at the work being done in Australian universities, the CSIRO, Telecom's Research Laboratory and in DSTO on telecommunications (and there's a hell of a lot), a very high percentage of it concentrates

on B-ISDN. They are all frantically working on ATM, gigabit switching and multiplexing, and video compression systems for the home.

But there's something dreadfully out of kilter here. If, as Telecom claims, we can expect 'near broadcast-quality video' to be delivered at rates as low as 1.5Mbps, then why do we need downstream rates of 620-Mbps? It's not suggesting that every home needs 400 TV sets, surely?

My guess is that compression systems capable of providing acceptable PAL quality, 4-by-3 pictures, for entertainment purposes will require a bandwidth of about 8Mbps. The wide-screen sets (I don't include high-definition — I don't think it's viable) will need about 12Mbps.

This gives us a domestic requirement for total bandwidth still only in the low double digits. Personally, I tend to believe that an integrated broadband system based on 2Mbps (upstream) and, say, 50Mbps downstream in the CAN will be more than adequate for the next few decades — and these are coaxial data-rates!

When FTTH consumer trials have been conducted anywhere in the world, all of these theoretical services — interactive video, videophones, electronic newspapers, home shopping and banking — have been greeted by collective ennui on the part of potential customers. Even in Hong Kong and Japan, the two countries that most epitomise serious yuppie techno-grab, less than 1% of homes have been linked up to ISDN.

Despite hundreds of fibre trials, I can't think of one occasion where I've seen a press-release reporting 'Trial Participants Wildly Enthusiastic about Home Shopping System!' or 'Education Breakthrough in Interactive Learning via Fibre.' The best you get when you read some of these trial reports, are carefully-hedged phrases of tepid approval from academics keen to maintain funding for future research.

Only entertainment television (and, specifically, cable TV which is funded mostly by advertising) can be counted as a substantial domestic success. Even Pay TV over cable is a marginal operation: Although the cable enters 60% of American houses, only 11% of them are willing to pay an extra premium for scrambled subscription Pay TV services.

So even in a nation with a mature cable distribution medium, the natives aren't all that happy about buying any video service costing more than \$20 a month — and that price includes both the 'carriage' and the 'content.' In Australia, where householders are traditionally used to receiving television free over the air, Telecom faces an even more difficult up-hill battle.

## Network Topologies

As every visitor to America can testify, cable TV — standard, or premium — doesn't need the capital cost of a fully-fibred star-network. It is provided on cheap coaxial-copper

bus, looped through the streets on poles, with tails running into each house — it is a community antenna system. Yet in most of the world, this decidedly low-tech cable service is still seen as a viable competitor to highly sophisticated fibre-to-the-home.

Over the years there have been attempts by the cable companies to provide individual interactive services over these common-bus topologies. Recently there have been numerous trials which provide PABX links and digital inter-LAN connections on the same coaxial as the analogue TV transmissions; albeit over a limited range.

No-one pretends, however, that this cable TV network topology or the current analogue FM technology is going anywhere — although perhaps the real questions should be: 'Is it adequate?' and 'Do customers really want more?'

Telecom's Lasercast service which delivers tourist television services to a number of city hotels, is based on some new American cable technology. It uses AM-modulated video-pumped down fibre from a central hub, which then branches out through coaxial links in the hotels. Lasercast works extremely well over distances up to 25km from the source and it can provide some two-way links for videoconferencing.

## Fibre-to-the-Curb

There are a number of half-way bus topology architectures which offer a bit more than just analogue Cable TV, but cost less than full-scale FTTH. These are last-kilometre systems sprouting from FSA substations.

Fibre-to-the-curb (FTTC) means that the fibres get close to homes, and then branch out with coaxial dropwires from a local pillar to 8, 16 or 32 homes. 'Only the one piece of opto-electronic converter gear is needed to do that,' Telecom points out, but neglects to mention the additional complexity of the home electronics.

US company, Raynet, has been pushing an optical star-bus FTTC, system called LOC (Loop Optical Carrier) for a couple of years, and Telecom's study groups have been checking out the trials. Raynet's system is supposedly the first real multipurpose fibre service available off the shelf, but it's actually a bit of a cheat. The standard Raynet cable consists of six fibres; two carrying voice, two carrying data, and two which are one-way video feeds — so it is more a 'composite cable' system than a multipurpose fibre technology.

Interestingly, I have on file two Nynex press-releases dated almost exactly three years apart (Jan 30, 1990 and Jan 13, 1993) both announcing the world's first FTTC trial, based on Raynet's LOC. Somehow, I doubt the first was wildly successful.

What is interesting here is that the 1990 press release says the Boston trial was for telephony only 'but upgrading to video is possible.' The new 1993 press release boosts our confidence in the rapid advance of the

A simple call is all it takes  
to find out how to save on  
long distance calls.

Lets spell it out. AAP Telecommunications offers a viable alternative to Telecom when it comes to long distance business calls, no matter how big or small your company is.

AAPT are the business specialists with over eight years local and overseas experience. We offer easy, intelligent solutions that can help your company achieve that competitive edge, by saving up to 30% on your long distance phone bills. AAPT's unique billing and management reporting system also allows you to keep track of where your telecommunications dollars are going.

And it costs nothing to find out how.

Just call.

008 802 818

**AAP**  
TELECOMMUNICATIONS  
A better deal for business.

## Trials and Tribulations

If you look around the world at the present time there are literally hundreds of FTTH or FTTC trials. America alone has about 50. With this wealth of evidence, you'd easily be seduced into believing that suburban fibre technology was mature; that costs were now low enough, and that some obvious demand must exist for broadband domestic services which can only be provided by glass.

But you'd be wrong. What is really driving FTTH is business politics and the scramble for dominance in a number of pseudo-competitive environments.

Fibre trials have been around now for one and a half decades. The first was the Hi-Ovis trial conducted by MITI in Japan between 1978 and 1980 (in Higashi Ikoma New Town near Osaka). This was, in fact, a continuation of an earlier Tama New Town CCIS (Coaxial Cable Information Systems) experiment which started back in 1976. Tama, in particular, tested the desire of home-owners to have interactive video, home fax, etc. over a period of a couple of years.

The reports of these combined trials showed the Japanese Ministries involved (MITI and MPT) fairly convincingly that there was no over-riding desire on the part of their residents for most of the broadband services tested, and this has been confirmed since by more recent studies in Biarritz, France.

Since that date, with the exception of Biarritz, most of the trials have been devoted to testing technical installation procedures and checking the splitting and multiplexing systems for quality and maintenance problems. These are not 'consumer,' but 'technology' trials.

With only a few exceptions, most trials have been conducted using household numbers of between 100 and 400 — which is nowhere near enough to permit the development of any realistic on-line 'experimental' services like Open University courses, comprehensive video-on-demand, special financial facilities, educational databases, etc. Few commercial organisations will have the funds to set up and run (for a few years) an electronic trial service which is only reaching a few hundred homes — although in Wollongong, Telecom and Transport and Com-

munications Minister, Senator Bob Collins, apparently think this is likely!

The main reason for many of these trials is to serve political purposes. The main practical value that the telcos get out of them is a chance to study the feasibility of the various technologies and the installation procedures — not to test consumer demand — no matter what spin the flaks try to put on it. In Wollongong, for instance, Telecom will be trialling analogue Lasercast and digital Laserlink over a T-PON system, and probably video-over-copper as well — but to 200 homes in total. At these numbers consumer reaction will tell them nothing.

Many overseas trials being mounted today are still introduced as 'telephony only,' but increasingly they add analogue video at a later date. With the new open-market ruling in the US, video should move over onto these systems rapidly. Most of the video is distributed in FM modulated form, although analogue AM is finding favour. Digital video is well down the track, and only a couple of companies are experimenting with switched broadband services.

Germany's largest trial project, now being run in the state of Brandenburg, has only this year begun to provide video (stripped in those US trials). Where video is provided, they generally seem to be providing far fewer channels than conventional coaxial cable networks.

The fact is that even after a decade of trials, fibre-to-the-home systems are still in the nursery and, like trees in a forest, they are competing to survive. There is no clear winner — and even the old copper twisted-pair-plus-coax system has a big chance of surviving against the inroads of fibre for at least a decade.

The Japanese, who have led the world in this technology (and certainly in the study of consumer needs) have just begun a three-year project called 'Study Group on Cable Systems Using Optical Transmission Technology' (beginning October 1992). The Japanese hope that FTTH will begin to enter the network of their highly-populated country sometime after 1996.

You can probably bet that Australia will follow about five years behind.

**Stewart Fist**

technology by making the definite/maybe statement that these new trials 'have the potential to be upgraded in the future to transmit broadband services, such as video.' Such is the pace of progress! Nynex itself says that their main purpose is to evaluate Raynet's LOC-2 'party-line' system to see whether 'the cost of installing fibre in the local loop is now approaching that of copper' and check

whether fibre will reduce 'life-cycle maintenance of the local loop.' It's also looking at AT&T's 'triple star' version.

### Fibre-to-the-Home

All of the Passive Optical Networks (PONs) systems currently under evaluation take optical fibre right up to the home so they are FTTH systems as well. Interactive services

on a PONs network must be multiplexed through a single shared trunk fibre. In turn, this means that some sort of demultiplexing is needed to isolate telephony and data signals intended for each household. The cost-balance shifts from the fibre and street pillar, to the home-electronics.

FTTH can also be switched star networks using individual fibres between the exchange and the home. These will obviously cost much more for glass and ducting than PONs, but by switching the signal at the exchange, they avoid the need for the complex home electronics. The home units only need deal with one or two video channels (at the most) and a few voice/data services — yet the star network can provide almost infinite capacity and selectability — any signal which can be delivered to the exchange, can be switched to the home.

A couple of relatively new technologies are making all this possible and practicable. Wavelength Division Multiplexing (WDM), uses different parts of the optical spectrum for the different services, and this greatly reduces the demultiplexing problems.

Good linear lasers are also a recent development. These have permitted analogue video to be carried in fibre using relatively standard AM or FM modulation which keeps the electronics simple. Before linear lasers, Pulse Frequency Modulation from bursty 'digital' lasers, were used for analogue optical transmission. But this made amplitude modulated video impossible, and AM is more spectrally efficient than FM. (You'll notice that almost no-one is talking much about digital video over cable — it seems such an unnecessary complication with such bandwidth.)

Erbium-doped optical fibre amplification increased the range of all fibre carriers to about 50km without repeaters: And the amplifiers can be used to boost light-levels in passive-splitting systems. Optical fibre amplifiers also handle WDM equally with more common time-division systems, and they do not distinguish between analogue and digital.

But according to a British Telecom Research Lab executive speaking on PONs at Telecom '91, "In practice (at least in the medium term) the optical power margins do not allow broadband signals to be cost-effectively received due to the high loss of the optical splitting network." My guess is that the new linear lasers have since solved this problem.

The most advanced trial of PONs networks appears to be one at Bishops Stortford, a self-contained township of 12,000 residents, 30 miles from London. 'Several hundred subscribers will be connected' according to the PR handouts, and the trials will cost £5 million.

T-PON (Telephony only), will eventually be upgraded to B-PON (Broadband PON) with 16 FM video signals together with 12 stereo channels of FM audio, and a Prestel-like Videotex service which can be viewed

# The Future is Now: **MOD-TAP HIGH PERFORMANCE SYSTEM 100**



**MOD-TAP System100**, a family of high performance Unshielded Twisted Pair (UTP) and fiber products designed to take your cable plant into the 21st century.

**UTP products are available to meet EIA/TIA 568 Category 5 standards** for applications which operate at up to 100 Mb/s. We have achieved full Category 5 compliance (over all four pairs) by inducing a phase shift of the unwanted NEXT signal. We have combined independent compliance tests with our legendary quality and support services to provide one of the highest performance, feature rich solutions available today.

**Fiber products are available to support all applications.** Products exist for single mode and multimode technologies. All of the most common and standards-compliant connectors are supported.

System100 products include a wide variety of wall outlets, cross connects, and cables for use in virtually any application and environment. All our cabling products are AUSTEL approved for your security.

**The key to System100 is integration.** We have combined both technologies – fiber and high performance copper – into a single, easy-to-use, system. We believe that in the cable plant of the future, demarcation between these two technologies will disappear. MOD-TAP recognizes that the cable plant of the future will be an integrated UTP and fiber system that can be managed as a single entity. The future is now – *System100*. Call us before your next cabling installation.



**MOD-TAP**

MOD-TAP  
(Australia) Pty Ltd  
86 - 100 High Street  
Melton, Victoria 3887  
Tel: 03-7478322  
FAX: 03-7478627

Send today for your free 1993 catalogue.

Name \_\_\_\_\_

Address \_\_\_\_\_

Tel: \_\_\_\_\_ FAX: \_\_\_\_\_

## Asia-Pacific Plans

### KOREA

Korea Telecom (KT) has plans to build FTTH networks between 1994 and 2015. By 1996 it expects to have more than 800,000 subscriber lines in optical fibre, and a model 'optical fibre city' will have been fibred for trial purposes in this period. It plans a parallel coaxial cable TV system which will be used as an interim measure. KT's schedule for FTTH calls for 4.65 million subscriber lines by 2001, 12.74 million by 2006, and for the eventual virtual total replacement of copper by 2015.

### TAIWAN

Taiwan has a six-year, multi-billion dollar plan for general improvement of the nation's telecommunications which began in 1992. Only 4% of the finances are allocated for optical fibre developments. However a complete nationwide FTTH network is envisioned for 2020 at a projected cost of \$US20 billion.

### JAPAN

The Japanese are not proposing to go with curbside systems as a interim step, but jump directly to FTTH. Japan has a high number of subscribers per unit area, and short average subscriber-to-exchange distances of around two kilometres. NTT is now developing three types of subscriber systems: A low-rate telephony-only hybrid fibre/copper system, an interim passive-splitting all-fibre network with video, and the ultimate high-speed Broadband-ISDN network next century. FTTH is now projected to reach most Japanese homes by around about 2015.

### HONG KONG

By mid 1993, all 2.9 million subscriber lines in Hong-Kong will be linked to digital exchanges supporting ISDN. Hong Kong has an open access policy for cable TV, but to date none has been installed. This is about to change however, with the new 22 channel 'Wharf TV' cable-linked network, which relies on micro-wave for the 'last-kilometre,' due later this year. It is anticipated that optical cable is expected to spread to reach 1.5 million subscribers in the first three years. HongKong Telecom, which has the phone-service franchise until 1995, has currently taken fibre into only a-round 300 office buildings. It has no firm plans to replace copper with fibre in residential areas, and says that it will wait until user demand for end-to-end ISDN is visible.

**Stewart Fist**

without the need for an adaptor. These signals are demodulated at the set-top into UHF using a modified off-the-shelf satellite receiver. A parallel comparison trial is being conducted with the BIDS (Broadband Integrated Distribute Star) network which uses exchange switching to handle the video and interactive services.

## The Asian Experience

Under the joint guidance of MITI (Ministry of International Trade and Industry) and MPT (Ministry of Posts and Telegraphy) the Japanese are looking at three prototype suburban fibre systems. There appears to be both a government-sponsored view of FTTH, and a quite separate one from NTT. NTT has a very detailed 25-year plan which specifies, for instance, which prefectures will be fibred in each of the next 23 years. They say that they will have all business districts, and 80% of homes fibred by 2015, but they aren't in a hurry to start.

Despite the NTT President's change of heart, MITI's long-term plans still include Broadband ISDN with an estimated capital investment of 33 trillion yen (\$A380 billion) necessary by 2015. This is government policy. But MITI also claims that by 2020 the fibre telecommunications network will generate no less than one-third of Japan's national income. There must be a Telecom PR man there on secondment: This is a highly inflated figure which places the fibre telecoms business above all Japan's electronics, camera and car industries combined.

NTT says that it intends to install optical fibre domestically only when maintenance and facilities for simple telephony services justifies the cost: They won't be taking video-over-cable into their considerations. Its first aim is to provide a fibre-feed to any new home which requires more than one telephone connection. "After a field test of about one year's duration, it should be possible to start commercial operation — perhaps as early as 1995" says Ikutaro Kobayashi, Manager of NTT's fibre laboratory. "We see the way open if we spend another two or three years paring down costs."

Currently NTT envisages this fibre-telephony being delivered via a Passive Double Star topology supplying 16 homes, each with up to 4 phone services. The fibre will use TDD (Time Division Duplex or 'ping-pong') multiplexing for bi-directional operations. Each home will have 1.5Mbps of allocated bandwidth (equal to 24 ISDN B-channels), and the TDM/TDMA transmission rate on the shared fibre is 28Mbps, both transmitting and receiving.

In planning, it is looking at this optical coaxial telephony-only system as a quick first step only. The Passive Double Star network will later evolve into an all-optical second stage with analogue cable TV channels (11 AM or 50 FM at 2.5GHz) as well. Eventually, NTT will move to a full B-ISDN all-optical star network in the next century.

The Japanese aren't as keen as the Americans on fibre-to-the-curb systems as a migration path to full FTTH. Conversion from optical to electronic signals at the curb-side necessarily involve a relatively large 'active pillar' and these are difficult to locate in narrow Japanese streets.

## Copper-Fibre Watershed

For at least five years Telecom has been assuring us that glass is now a more economical approach for new telephone installations than copper, even if nothing more than a basic telephone service is on offer. I guess this is intended to reassure us that the current suburban fibre projects are not increasing our phone bills, but rather reducing them.

But consider: 1. Eventually they must get it right; 2. Politicians and the public have short memories; and 3. With a monopoly in the CAN, Telecom can submerge the fibre-installation costs in a confusion of cross-subsidisations.

Your judgement of whether the watershed has been reached between copper and glass, depends on cultural assumptions. If you are relatively certain that fibre will be needed in the subscriber loop by 2000, you will applaud the fact that Telecom has deployed glass early without waiting for the true financial crossover point. However, if you doubt that these high-bandwidth services will be required in the next few decades, then you will view this same action as a criminal waste of taxpayer's money. Either way, this is one of those cross-subsidisation decisions that the average subscriber must grin-and-bear, and which are totally outside public or political control.

Telecom, of course, is in favour of fibre. It is also in favour of video-over-cable, since this is essential to make the whole system pay. But John Murphy (Assistant Director, Strategic Directorate) says that AOTC's "investment in optical fibre to date is . . . justified purely on the basis of carrying telephony and data services according to normal demand, with some allowance for future growth." His associate, David Pitt, isn't quite so sure. He believes that fibre in "new subdivisions in new situations will be economic between 1995 and 1997, and indeed, for retrofit situations, at the very end of the decade." Telecom, he said "would be doing that for telephony, and it would be economic for us to do it that way for telephony [only]."

"[However] it is certainly true that at least in the early years, let us say in the first half of this decade, Pay TV provides the critical mass for the way into the new information age," Pitt says.

In fact, some people might say that it provides the *only* mass — the only rationalisation which can support such massive expenditure. I'm going to sit on the fence here — I really can't decide!

*Stewart Fist is a freelance journalist based in Lindfield (NSW).*

# AS/400, S/3X<sup>®</sup>

## NETWORK & CABLING SOLUTIONS

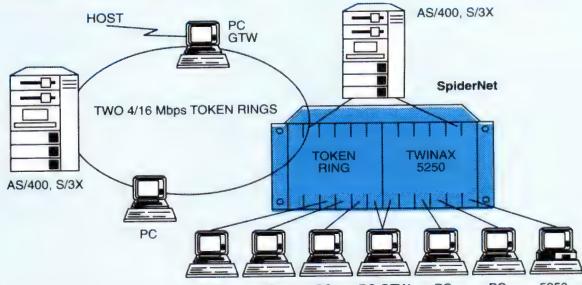


**SpiderNet**

MULTIMEDIA INTELLIGENT  
WIRING CONCENTRATOR

### FEATURES

- Fault tolerant concentrator for IBM AS/400 and 3270 and Token Ring LANs
- Structured wiring system, Ring-Wired-Star configuration
- Choice of coax, twinax, fibre or IBM Cabling System backbone interface
- Supports a combination of up to 70 Twinax devices or 128 3270 devices or up to 192 Token Ring stations
- Fully controlled by Spider-NMS and SNMP and NetView are supported.



**AWC**

ACTIVE CABLING CONCENTRATOR

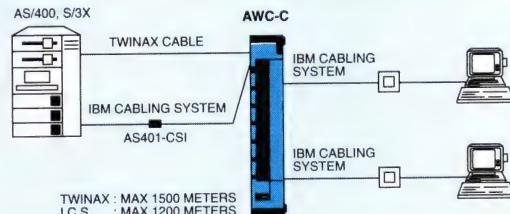


**AS-1299, AS-2299**

TWINAXIAL ACTIVE STAR FOR  
UNSHIELDED TWISTED PAIR

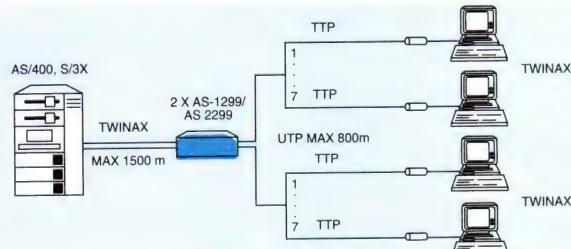
### FEATURES

- Allows the connection of seven twinaxial devices in a star configuration
- Device attachment via IBM Cabling System
- Host attachment choice of twinax, IBM Cabling System or optional fiberoptic cable
- Fault tolerance for cables and streaming terminals



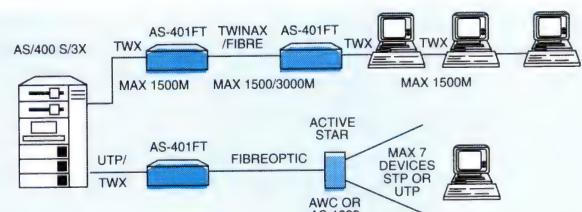
### FEATURES

- Host attachment media: twinax, unshielded twisted pair (UTP) or optional fiberoptic cables
- Twinax-to-twisted pair active star repeaters. Extensive filtering scheme extends the maximum distance of the devices from the host
- Fault tolerance for cables and streaming terminals



### FEATURES

- Supports up to seven twinaxial devices
- Copper to copper and copper to fiberoptic repetition
- Copper connections are either twinax or unshielded twisted pair
- Diagnostic LEDs



**AS-401FT**

SINGLE TWINAXIAL REPEATER

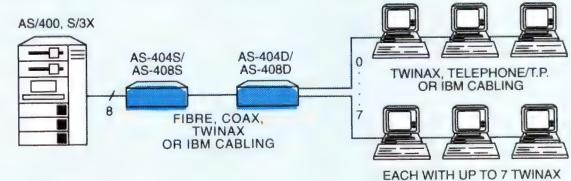


**AS-408, AS-404**

EIGHT/FOUR PORT TWINAX MULTIPLEXER

### FEATURES

- Supports up to 40 twinaxial devices
- Choice of fiberoptic, coax, twinax or IBM Cabling System backbone interface
- Increases transmission distance
- Diagnostic LED for each port



**ADACOM**  
COMMUNICATIONS

IBM, S/3X and AS/400 are registered trademarks of International Business Machines Corporation. All other product names and specifications are trademarks of their respective manufacturers.

**Dataplex**

Melbourne: (03) 210 3333 Sydney: (02) 349 3911  
A.C.T. (06) 285 3657 N.Z. 9 307 8139

# What you really want is a solution...



Insist on AT&T SYSTIMAX®PDS

Category 5 End-to End connectivity

from a single manufacturer...

Let allNET Technologies connect

you with AT&T.

# Tomorrow's technology today.



allNET Technologies Pty Ltd  
Unit 8, 3 Gibbes Street, Chatswood, NSW 2067  
Telephone (02) 417 4800 Facsimile (02) 417 2281



# Coming Soon to a Network Near You

Wildly successful it may be, but the simple network management protocol could stand some improving, particularly with regard to network security features. Enter SNMP 2.

**B**atman Returns, Alien 3, Star Trek VI: Sequels are a sure sign of success in Hollywood. Now one of the networking industry's hottest properties is getting a sequel of its own: SNMP 2, the first revision of the hugely popular multivendor management protocol, is slated for release early this year.

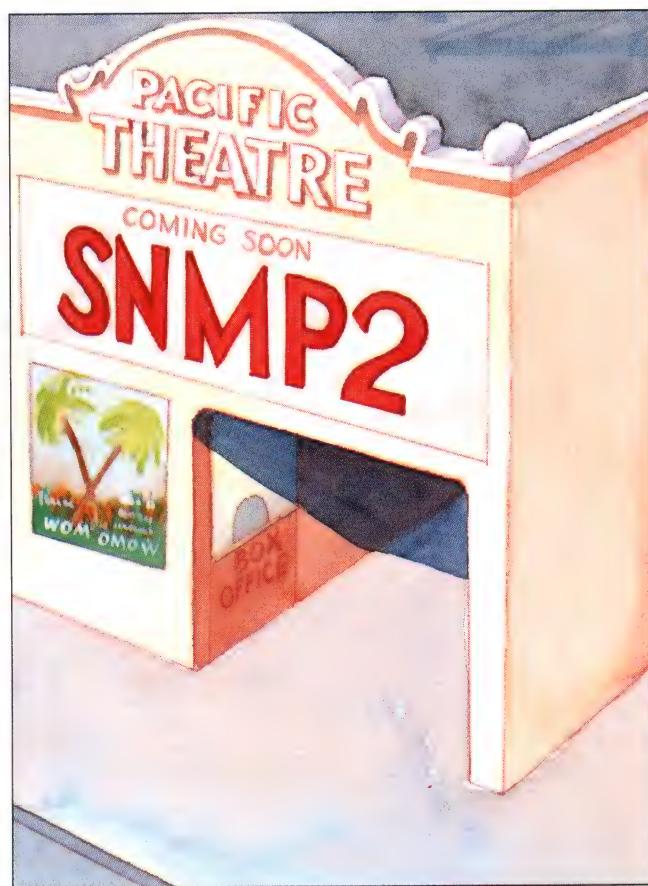
The upgrade, which comes just four years after the introduction of SNMP, is the handiwork of Internet Engineering Task Force (IETF) members Jeffrey Case, Keith McCloghrie, Marshall Rose, and Steven Waldbusser. An IETF working group has been evaluating their proposal, which the authors call the simple management protocol (SMP). But don't expect to see that name in lights: According to Bob Stewart, Chairman of the SNMP Version 2 working group and network architect at US-based Xyplex, the final cut will go by the title SNMP 2. That choice of names is meant to indicate that close connection between the revision and the original management protocol. Still, until the IETF approves the spec, SMP is the simplest — and most accurate — designation.

Given SNMP's enormous success, the upgrade might look like a case of 'if it ain't broke, don't fix it.' Today, roughly 25% of all network management systems worldwide use the protocol, and SNMP vendors are growing at up to 75% annually. Even more impressive, the number of network devices that can be overseen by SNMP has increased by two orders of magnitude in the past two years or so.

But critics have never shied away from pointing out inherent limitations in the SNMP framework. For instance, while the protocol's connectionless transport and small set of simple commands allow it to be put on devices with limited memory, like bridges and routers, they also generate an excessive number of packets on most networks, slowing response time. The larger the network, the more packets generated and the more bandwidth consumed.

SMP, in contrast, delivers an array of messaging options that enable agents to communicate more efficiently with management stations. Further, SMP's bulk retrieval mechanism lets management stations obtain reports from agents about a range of variables without issuing repeated requests. These features alone should dramatically improve the performance of SMP systems by reducing the number of packets in messages. One of SMP's most significant contributions is manager-to-manager communications, which allows a station to act as either manager or agent. This allows SNMP systems to offer hierarchical management — a significant first — including mid-level managers that offload tasks from the central management station.

SMP also ends its forerunner's reliance on TCP/IP. The upgrade runs over AppleTalk, Internet Packet Exchange (IPX), and OSI



protocol stacks, clearly a boon in this age of multiprotocol corporate backbones. It also should help boost SNMP around the world.

## A Security Blanket

For many users and vendors, though, SMP's chief attribute is the way it addresses the long-standing problem of SNMP security — or rather, lack of security. This may well be the original protocol's primary flaw, limiting applications to simple monitoring and fault

## SMP — Straight From the Source

It's hard to argue with success. The simple network management protocol put simple, straightforward network management in the hands of users, and users put SNMP to work with a vengeance. In the four years since its introduction, SNMP has been implemented virtually everywhere: PCs, Macs, bridges, routers, hubs, file servers, and hosts (as well as other networking devices). It's now the premier protocol for overseeing multivendor internetworks.

Given the track record of SNMP, why would anyone want to tinker with it — especially four of its leading proponents?

Well, no one (least of all the four of us) ever claimed the protocol is perfect. In fact, SNMP's enormous popularity has meant that its supporters have concentrated more on keeping the installed base stable rather than on refining the protocol. Enhancements have been made in the least intrusive way possible, by adding new objects to the management information base (MIB).

But other problems (such as speed, security, and system management) aren't addressed as easily. In 1991, succumbing to mounting pressure from users and vendors, the Internet Engineering Task Force (IETF) decided that security was too important an issue to delay any longer — even if adding it meant changing the protocol. Last year the IETF approved Secure SNMP — the first significant change to the protocol's framework.

Around the same time, the IETF issued a request for proposals to address other SNMP shortcomings. But as developments in Eastern Europe have made all too clear, change can be very difficult to control. In order to ensure orderly change rather than anarchy, the four of us teamed up to create, document, and implement our proposed revision to SNMP — the simple management protocol (SMP) and its framework. We included Secure SNMP in our specification so that only one upgrade would be needed across the industry. In so doing, we felt it would be possible to boost performance and enhance security while keeping disruptions to a minimum.

### Designed for Success

The simple management protocol design was motivated by the same architectural considerations key to SNMP: Minimising the cost and complexity of network management agents and putting net management in centralised stations.

detection instead of the configuration and task automation SNMP is truly capable of.

Security concerns have also kept SNMP out of certain networks. Most carriers, for example, refuse to offer SNMP for their network services. The IETF already addressed

Because there will always be more agents on a network than management stations, it's essential that the former consume fewer system resources. A guiding principle of SNMP and SMP is to shift the burden of processing from agent to manager whenever possible. This ensures that the device hosting the agent will remain free to do its primary job. Giving agents too many management duties can result in a whole range of network anomalies, from reduced response times through to full-blown broadcast storms.

SMP, as noted, builds on Secure SNMP as defined in RFCs 1351, 1352, and 1353 — with two major exceptions.

First, SMP makes Data Encryption Standard (DES) encoding optional instead of mandatory. This was done because the US Government does not allow DES-encrypted source code to be exported.

Second, SMP allows SNMP packets to arrive at a management station out of their transmitted order. Secure SNMP requires packets to be delivered in order, since those that don't may have been intercepted and copied by an unauthorised party. But most networks reorder packets in the course of regular data transmissions, especially during times of stress — precisely when net management is needed most. To meet the requirements of Secure SNMP, messages would have to be re-sent until received in order. This slows response time.

### The Joy of Sets

SMP improves the operation of control functions via the SET command in two ways. For one thing, it introduces a locking scheme that gives a management station uninterrupted access to a device while it is being configured. When invoked, the lock ensures that only one station can access an agent or group of agents at a time.

For another, SMP clarifies the procedures to be followed when creating, modifying, and deleting rows from tables. The ROWSTATUS mechanism borrowed from the RMON MIB allows a management station to create new variables, such as a routing table entry, in a standardised way.

Further, Secure SNMP and the improved SETs open the door to applications that demand extensive configuration capabilities, such as the administration of network users on a file server.

SMP makes a small change to SNMP that yields a major improvement in perfor-

mance. The new GETBULK command activates a bulk retrieval mechanism that allows a management station to retrieve a range of variables simultaneously. This mechanism uses a minimum amount of system resources and is easy to implement. Formerly, most vendors programmed their SNMP stations to send a GETNEXT for each variable to be retrieved. This slowed response time considerably. SMP transfers using GETBULK typically run more than 10 times faster than SNMP transfers.

SMP defines a few new data types, including 64-bit counters. A counter is a type of SNMP variable that (as its name suggests) counts the number of times an event occurs on a system, such as the number of packets received. SNMP already offers 32-bit counters, but as networks get faster and more complex, these are becoming outdated in some environments. If the number of events recorded by a 32-bit counter exceeds 32 bits, the counter starts over from zero without notifying the management station — in effect losing track of the actual number of packets passed.

SMP also introduces a data type for OSI addresses that will help extend management to OSI networks.

In addition, SMP subtypes allow data to be defined in different ways, depending upon context. An IPX address can be created using the SMP OCTET STRING data type; a timestamp can be defined using SMP's TIMETICKS data type.

If an SNMP agent can't respond to some portion of a station's request for information because it isn't equipped with a particular MIB, it will reject the entire request. SMP addressed this problem by introducing 'exception conditions.' If an SMP agent can respond only to part of a station's request because it is missing a particular MIB variable, it can flag the missing piece as an 'exception' and return the rest of the data.

SMP also furnishes a richer set of error codes that agents can use to explain their inability to respond to a management station's requests. For example, an SMP agent can tell a station that a SET request contains a value that is too long or that makes no sense.

Such error messages offer management applications more information about the nature of agent failures, so they can determine if failures are permanent or temporary and take appropriate corrective action.

this issue with Secure SNMP, a set of specifications that adds user validation, message protection, and data encoding to SNMP systems. But Secure SNMP's repetitive messaging structure consumes even more bandwidth than SNMP alone, clearly a problem.

SMP modifies Secure SNMP, making it more efficient. Tests conducted by SMP's authors indicate that their proposed protocol processes significantly more variables per second than SNMP (see Figure 1 on page 74). And when Secure SNMP's authentica-

This gives SMP applications a better opportunity to respond to an error without involving a human operator or to provide an operator with more information to solve the problem.

## Communications Concerns

SMP builds support for manager-to-manager communications, a feature missing from SNMP. First, SMP adds acknowledged information transfers between two management stations, including reliable event notifications. With the INFORM command, one management station can send information to another — not possible under SNMP — and request confirmation of message receipt. Second, an SMP MIB has been defined that controls how events at a management station may be generated and transmitted to another SMP management station.

Besides allowing information transfer between management stations, manager-to-manager communications allows a hierarchical network management system to be built. On such a system, a mid-level management station local to a LAN would poll the devices on that LAN. When a fault is detected, the mid-level station could transmit an event notification to a higher-level station on the backbone. This reduces the net management traffic flowing over the backbone while retaining the reliability inherent in a polled environment.

SMP offers a way to add machine-readable annotations (also called 'macros') to MIBs. Although it is possible to annotate a MIB under SNMP, comments are lost when the MIB is compiled because they aren't machine-readable. Five new macros have been defined: Object-type definitions, object-group definitions, module-compliance definitions, agent-capabilities definitions, and trap definitions.

These macros also establish a structure for MIB annotations. For instance, a macro can detail how well a vendor's MIB matches the standard MIB. It might indicate, among other things, how many of the nine groups of the RMON MIB a network monitor agent implements. Macros will help ensure interoperability, and users will be able to point to macros when making requests of vendors.

Several of SMP's features also eliminate many of the TCP/IP biases of SNMP. Transport mappings are specified for multiple protocol stacks, including TCP/IP,

IPX, AppleTalk, and OSI's connectionless network protocol (CLNP). Others can be specified as necessary.

These transport mappings furnish a simple way to describe how to place SMP messages into these stacks. Proxy agents (conversion software) allow TCP/IP management stations to talk to other protocols on non-TCP/IP networks and to incorporate SMP without assigning IP addresses to large numbers of systems.

One of the main design goals of SMP is backward compatibility with SNMP whenever it's reasonably possible: SNMP MIB definitions are fully compatible with the SMP framework. The SMP proposal includes one document devoted to coexistence and transition. Two primary approaches are suggested: bilingual management stations and the use of proxy agents.

Bilingual management stations implement both SNMP and SMP. A bilingual manager sends SNMP queries to SNMP agents and expects SNMP responses; it also sends SMP queries to SMP agents and expects SMP responses. This means changing the management station's software but makes it possible to take full advantage of SMP. Bilingual agents are discouraged because they can add too much of a burden to their host devices.

Alternatively, a proxy agent may be used to convert from one message format to another. For example, a management station might support only SNMP, converting SMP messages via proxy agent. This approach allows management station software to remain unchanged but limits the degree to which it can exploit SMP.

We have implemented both of these suggested primary approaches and found both to be workable.

*Jeffrey Case is President of SNMP Research and the co-author of several management standards, including SNMP. Keith McCloghrie is a Director of Engineering at Hughes LAN Systems. He has written a number of Internet standards and is the co-author of MIB II. Marshall Rose is a Principal at Dover Beach Consulting, a computer communications consultancy. He has developed source code for TCP/IP and OSI and is a co-author of MIB II. Steven Waldbusser is a consultant and the Manager of Network Development at Carnegie-Mellon University in Pittsburgh. He is the author of RMON MIB and AppleTalk MIB. All are based in the United States.*

by SMP's authors. But the IETF task force has opted to keep its evaluations of SMP and Secure SNMP separate, although every effort will be made to finish them at the same time to hold to a minimum any disruptions to SNMP's installed base.

## No Pain, No Gain?

SMP's authors envision a smooth transition to the new spec (see 'SMP — Straight From the Source'). First, they say, management systems will change, then agents. When SMP has been universally implemented, SNMP can be eliminated.

Others are sceptical. "Even though SMP will be widely accepted, all of this won't synchronise early on as easily as the SMP proponents say it will," says Asheem Chandna, Senior Product Manager at SynOptics Communications. "No technical document can answer the question of how users are going to implement SMP or support the migration from SNMP to SMP or the coexistence of the two protocols."

Some of those questions can be answered now, at least in theory. New software will be needed that lets SNMP stations manage devices equipped with both SNMP and SMP agents. And network devices once managed with SNMP will need to be outfitted with SMP agents if they are to take full advantage of the upgrade.

A few device vendors will be able to install bilingual agents on new products that have the memory to handle the extra SMP software — though this approach isn't likely. Many vendors will wind up offering two versions of the same product, one with SMP, the other with SNMP. As Chandna cautions, "1993 will be confusing. But in 1994, we'll start to see SMP pay off." And William Yeager, Computer Systems Specialist at the Knowledge Systems Laboratory at Stanford University, notes: "SMP and its suggested improvements are good tools, but they are only tools. It's software, not management protocols, that stands to provide really significant wins for users."

The first SMP upgrades should begin to reach the market late in 1993 (some vendors are readying prototypes for coming trade shows), but most vendors say shipments will start after the IETF standardises SMP.

The sheer volume of those shipments is likely to reach huge proportions. SNMP is the de facto standard for managing LANs and internetworking equipment. Thomas Nolle, President of market research consultancy CIMI, says users' worldwide investment in SNMP in 1992 should hit US\$28 million, compared with the roughly US\$215 million spent on proprietary management systems like IBM's NetView and less than US\$2 million on systems with CMIP (common management information protocol).

The number of MIB (management information base) objects defined by users and vendors for SNMP rose from about 100 at the start of 1990 to roughly 23,000 in 1992, according to The Yankee Group. And SNMP sales are on the rise. International Data Corporation (IDC) estimated that there were 20,780 SNMP systems installed worldwide by the end of 1992, compared with 9,695 at the end of 1991.

# NEWS

In this fast changing industry you need a publication that brings you the news as it happens. One that is written for the telecommunications professional. One that gives you only the news: concisely, readably, accurately, and objectively.

That publication is *Exchange*, the leading news weekly for the Australian telecommunications industry.

For a free sample of next week's edition, fax your name and address to:

**(02) 818 2294**

Or call us on:

**(02) 555 7377**

# Exchange

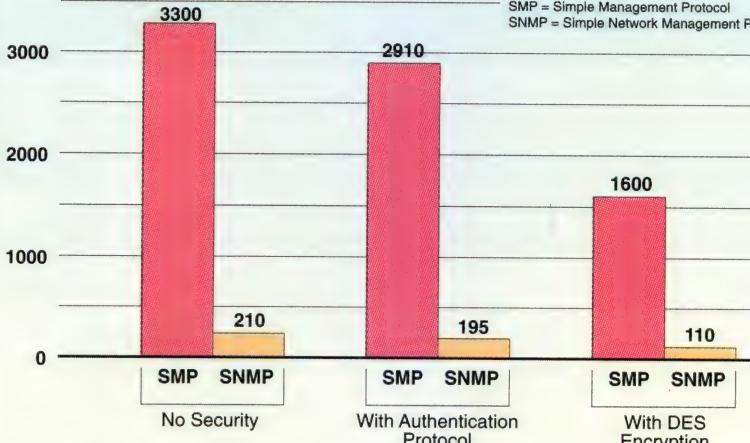
SHOULDN'T YOU BE READING IT?

Figure 1: Outprocessing SNMP

Variables processed per second

4000

DES = Data Encryption Standard  
SMP = Simple Management Protocol  
SNMP = Simple Network Management Protocol



Source: Steven Waldbusser, Carnegie-Mellon University

## Paring Down Packets

One of the ways that SMP reduces the number of packets sent over a network is with a bulk retrieval mechanism activated by its new GETBULK command. Most SNMP systems, in contrast, repeatedly invoke the GETNEXT request to obtain reports on a range of variables in an agent. To retrieve router address tables or other lists from SNMP devices, for example, a management station must issue a GETNEXT for every item on the list.

"The real processing load in an SNMP system comes from the number of packets passed between management station and agents, not the size of the packets or the polling frequency of the station," claims Yeager. "The bulk retrieval mechanism in SMP will cut down on the number of packets processed, reducing the amount of bandwidth consumed by the protocol."

SNMP's messaging vocabulary is also limited. For instance, if a management station asks a device to report on a feature it doesn't possess, such as a particular MIB variable, the device returns an empty packet. Upon receipt of the blank message, the manager often repeats its original request, wasting bandwidth in an attempt to ascertain information the device cannot supply.

What's more, SNMP management stations can't distinguish among the many reasons that empty packets may be returned to them. The device may not be able to supply any information on a particular variable. Or it could be out of service. In either event, an empty packet is sent.

SMP's answer is to improve communications between agents and managers with new data types, event messages, and so-called exception conditions. With them, an agent can tell a management station why it can't

respond. For example, the agent may not be equipped with the desired MIB. Or it may have the right MIB but be missing a specific variable. Or it may be doing other tasks and unable to respond when asked. In each case, though, the SMP agent is not reduced to returning empty packets.

Another way that SMP improves communications is with manager-to-manager exchanges. To date, SNMP systems have been fairly inflexible when it comes to configuration: Management stations can communicate only with their agents, rather than with other stations. SMP, however, makes it possible for a management station to act as either manager or agent. By using the new INFORMREQUEST command, stations can communicate with one another. This feature opens the way to the first mid-level managers on SNMP systems, which will add a layer of management between central stations and agents.

Mid-level managers could be set up to poll several agents on a particular LAN segment and pass their findings along to the central console. This would be a god-send to a large organisation, since mid-level managers at remote sites could oversee bridges and routers on individual segments, reporting back to corporate headquarters as needed (see Figure 2 on page 76). And because mid-level managers free central stations from having to store large amounts of Secure SNMP information, such as passwords and validation codes.

SMP's manager-to-manager communications are augmented by Secure SNMP's Party MIB, which lets one station talk to multiple agents at one IP address. In other words, SMP lets more than one agent occupy one computer platform. This means SMP can be used to manage not just devices but all the components of a computer system,

# TWICE AS FAST

Bergman © International

## WIRE SPEED LOCAL BRIDGE 16/4

The results are in! Tests confirm that Olicom's new Wire Speed Local Bridge 16/4 is the fastest on the market.

It forwards frames of 256 bytes or more at close to wire speed, on a 16 Mbps LAN. And it transmits 28-byte frames at a blistering 27,000 fps—twice as fast as our nearest competitor.

Olicom's Wire Speed Local Bridge features dual management support—both IBM LAN Network Manager/NetView and SNMP—and is preconfigured for easy installation and use. It's part of a full range of Token-Ring products that are 100% IBM compatible and interoperable, and support all industry-standard network operating systems.

To speed your network's traffic, contact Olicom right away.



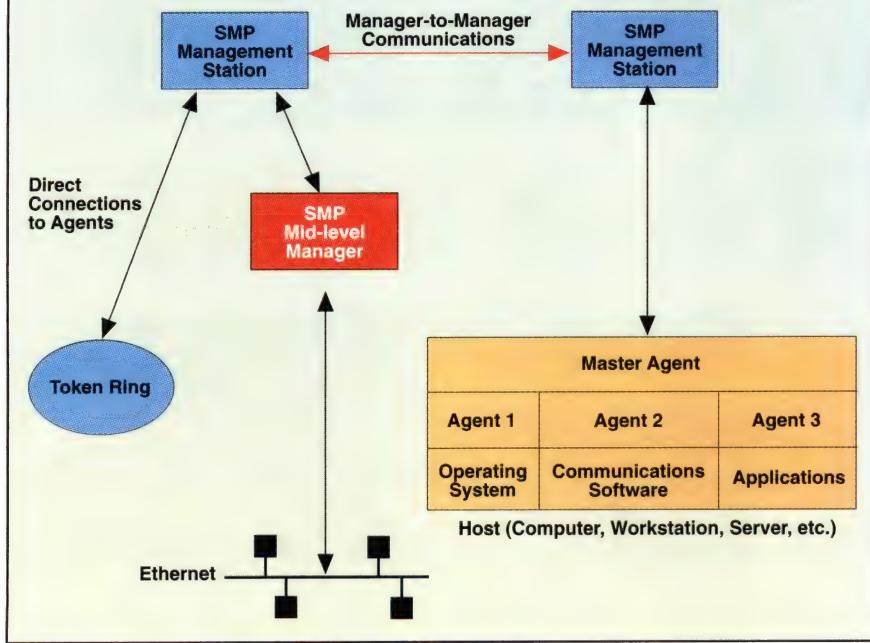
**olicom**   
TOKEN-RING SOLUTIONS

Australian Distributor for Olicom: FORCE TECHNOLOGY PTV LTD, P.O. Box 1516 · Dee Why, NSW 2099 · Ph: (02) 971 1000 · Fax: (02) 981 1932

IBM is a registered trademark of International Business Machines Corporation

Figure 2: SMP's New Look

SMP opens the way to new configurations, including mid-level management stations that can consolidate information and manager-to-manager communications. Secure SNMP makes it possible to support multiple agents on one platform.



including applications, storage, and communications software. Apple Computer and Sunconnect already say that SMP will help them build system management applications. SNMP, in contrast, lets only one agent be placed on a platform.

SMP's approach to putting multiple agents on a platform is not the first to be tried. Other techniques have been proposed, and many vendors have engineered their own solutions. SNMP Multiplexer (SMUX), published as an experimental document by the IETF, attempts to do the same thing, but has proven cumbersome. And proprietary solutions aren't always compatible with standard SNMP.

## Stations First

Vendors of management stations will probably be first out of the gate with SMP upgrades. Several strategies are open to them. For starters, they could simply scrap SNMP entirely and move to SMP — impractical as long as devices and systems in multivendor networks support SNMP.

Accommodating both protocols during the transition period is the path most vendors will follow, either with proxy software or with bilingual devices.

The proxy approach is the easiest to implement, though by no means the best choice. A proxy installed on a management station or subsystem translates messages from SMP into SNMP. This technique eases the transition to the new protocol but does not allow SNMP installations to fully exploit either SMP or Secure SNMP. Instead, SNMP agents coexist with SMP agents, taking basic

management information from them. Also, introducing a proxy between a management station and agent adds complexity and another potential point of failure to net management systems. Still, some vendors may elect to offer proxies until they are satisfied that users really intend to move to SMP.

The bilingual approach requires vendors to build management stations that can support both SNMP and SMP agents. The advantage to this technique is that it lets stations reap the full benefits of SMP while supporting older products as well.

The drawback is that designing a bilingual manager means re-engineering the management station, a more complex task than merely adding a proxy.

Still, this may not be as daunting as it sounds. The basic structure of SMP and SNMP is the same, which allows them to share underlying components and services.

Specifically, SMP and SNMP have a traditional hierarchical database structure in common, including an indexing mechanism for naming network entities and listing their specific attributes. SNMP uses simple commands like GET or SET to retrieve information from network devices and report it to the management station.

In most commercial SNMP systems, the information collected by a management station is translated into another format, such as a relational database like Ingres or Oracle, before it is displayed or used. Thus, changing the type of information that is fed to the relational database will not alter the overall design of the system. Typically, the upgrade from SNMP to SMP will involve adding to

the definitions, commands, and error codes that can be used. The management interface and applications can remain intact.

Given this, it's easy to see why some vendors believe an upgrade to SMP may even go unnoticed by users. Mike Erlinger, Director of Network Development at US-based Lexcel, says "SMP will provide a more efficient capability for moving MIB data around a system," but it won't alter the actual way that MIBs are handled. Actually, some vendors expect third-party developers of SMP applications to face the biggest challenge, since SMP needs new APIs (application program interfaces).

"The interface between management applications and SNMP or SMP can be the same for many systems," says James Herman, a Vice President of Northeast Consulting Resources. He points out that the same MIBs can be used with either SNMP or SMP. Herman says it may be considerably easier to add SMP to systems that deploy what he calls a 'network management platform' geared to multiple protocols. Such systems usually contain a core set of services that include a graphical user interface, communications software, and a set of object-oriented APIs. Since the APIs establish the links between management protocols and the core services, these systems are more or less indifferent to the source of the input.

Among the systems that now fall into the management platform category are the DECmcc director from DEC, HP Openview from Hewlett-Packard, AIX Netview/6000 from IBM, Netlabs/Manager from Netlabs, Novell NetWare Management System from Novell, and Sunnet Manager from Sunconnect. The quintessential management platform, the Distributed Management Environment (DME) being developed by the Open Software Foundation (OSF), will embody much of the technology found in current systems. All of the aforementioned vendors, and the OSF, say they plan to upgrade to SMP when users demand it.

## Double Agents

Vendors whose network devices are equipped with SNMP agents — like suppliers of management stations — have several options when it comes to upgrading to SMP. Here again, they may choose to do nothing, create two versions of their products, or create bilingual agents.

Many will likely choose the first path, leaving it to station suppliers to support SMP and waiting to see how it sells before adding new agents. Others — particularly those that support the RMON (remote network monitoring) MIB — may move to SMP along with the station vendors.

Agent vendors may also offer proxy translation software, which would run on their devices or attached computers. Once again, though, proxies can add another potential point of failure without delivering the

# SOMETHING'S BURNING. IT'S TIME TO TURN OFF YOUR LEASED LINES.



## SAVE HUNDREDS EVERY MONTH WITH DATABILITY'S MUX/ROUTER FOR DIAL-UP IP AND LAT ROUTING.

Money goes up in smoke when your leased lines aren't in use. Put out the fire with Datability's new Mux/ROUTER - the *only* internetworking product to combine multiplexer, terminal server, and IP and LAT routing capabilities. With Mux/ROUTERS and high-speed modems, users access remote hosts and LANs on demand. Transparently. Over money-saving, standard dial-up lines.

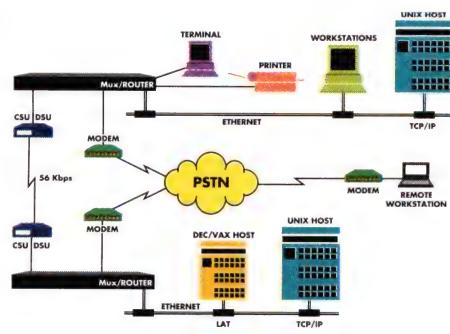
And if you get heartburn whenever remote DEC users need access to DEC systems, the sleek, low-cost Mux/ROUTER is your only solution. How did we do it? Simple. We stamped out the LAT routing barriers that have other manufacturers fuming.

Use its eight asynchronous ports for multiple connections to remote LANs. Replace multiplexers by directly connecting terminals to Mux/ROUTERS. Create dial-up links for tele-

commuters. Install it as a back-up system for leased-line routers. It's always there when you need it. And costs nothing when you don't.



Prove it to yourself! At absolutely no risk, install a pair of Mux/ROUTERS. You'll get toll-free, 'round-the-clock technical support. And whether through outright purchase or one of our flexible leasing plans\*, if they don't meet your performance and money-saving expectations, return them for a 100% refund. Guaranteed.



You don't have money to burn. So call Datability today at:

**008-812-589**

Or, fax us at 03-543-5582.

**DATABILITY**  
Sophisticated Technology Made Simple

\* U.S. and Canada only.  
© Datability, Inc. 1993. All product names are trademarks or registered trademarks of their respective manufacturers.

benefits of SMP. Vendors may also opt to create bilingual agents. SMP's authors, however, don't recommend taking that tack, believing that the burden of supporting two protocols should be put on the management station, not the agent.

The choice of agent strategy will depend largely on the resources available to the device and memory available in the agent. Some bridges and routers, for instance, are very tightly engineered and may not have the horsepower to support a bilingual agent. But most LAN hubs have plenty of extra processing power, and their modular architectures should make adding another agent relatively easy.

"We will probably provide a switchable SNMP/SMP agent for our hubs," says Roger Dev, Director of Software Development at Cabletron Systems.

Karl Auerbach, President of Californian-based Empirical Tools and Technologies, estimates that 50% to 75% of SNMP agent code will be reused for SMP agents. "The SMP agents can use the same memory, the same code that translates MIBs, and the portion of the agent that processes variables."

Despite such duplication, SMP agents, he indicates, will typically be twice as large as their SNMP counterparts, chiefly because of Secure SNMP code. But he points out that doubling the size may still yield an agent that uses less than 64K of memory. Some vendors are toying with the idea of implementing SMP without Secure SNMP. This scheme could severely limit a device's ability to work with other SMP systems.

### CMIP Resurfaces

In all the excitement surrounding the move to SMP, it's easy to lose sight of the fact that SNMP was originally seen as an interim protocol on the way to CMIP. In fact, the IETF planned to replace SNMP with CMIP once the International Standards Organisation (ISO) finished its work on the latter.

But users were understandably impatient for non-proprietary management for their internetworks, and SNMP — unlike CMIP — was ready to implement and easy to use. A skilled programmer can master the basics in one sitting. Best of all, SNMP was freely available on the Internet, where, for the price of a phone call, users could exchange implementation tips with the top software development laboratories in the US.

The rest, as the saying goes, is history. Today, CMIP remains a shadowy promise on the periphery of industry development and SNMP is a de facto standard. What's more, SMP will bring the protocol closer to CMIP. And there's even talk among SMP backers of lobbying the ISO through the International Telegraph and Telephone Consultative Committee (CCITT) or the American National Standards Institute (ANSI) to make SMP an accepted alternative to CMIP.

For most CMIP supporters, though, close isn't close enough. Tony Jeffree, a principal

### Securing the Message

Although SMP and SNMP are being studied by separate working groups of the Internet Engineering Task Force (IETF), the two are very closely linked.

Some of SMP's most important innovations stem from its use of Secure SNMP as a foundation. Further, the changes to the Secure SNMP standard (first approved by the IETF in March 1992) that the authors of SMP have proposed will make security easier to implement and more efficient. They will also make the upgrade to SMP far easier.

SNMP's lack of security has kept it off certain kinds of networks. Telecommunications carriers, for instance, have long felt that SNMP wasn't up to snuff when it came to protecting central office switches and other sensitive gear from intruders. Secure SNMP is changing that. US long-distance carrier MCI Communications announced last year that it would allow customers to use their own SNMP systems to monitor and configure MCI frame relay service subscriptions. And regional Bell operating company Ameritech is running a similar trial for SMDS (Switched Multi-megabit Data Service).

But Secure SNMP does more than simply offer a safe backdrop for SMP. The upgrade uses the Party MIB first intro-

duced in Secure SNMP to support multiple agents on a single platform (one of SMP's chief innovations).

The Party MIB allows a management station to communicate with multiple agents through one IP address — as long as those agents are properly registered as 'parties' with the management station. SNMP allows only one agent to access an IP address, which was usually assigned to the operating system of the device hosting the agent.

In essence, the Party MIB allows all the elements of a computer system — operating system, storage, and even applications — to be equipped with their own agents. When combined with SMP's manager-to-manager communications, the Party MIB enables a LAN server or workstation to act as a master agent, monitoring itself and other workstations.

Besides SMP, commercial products have started to emerge that address the issue of multiple agents. The most significant so far is Enhanced Management Agent Through Extensions (Emanate) from SNMP Research. Emanate equips an SNMP agent with a protocol that lets it link with other agents on the same platform or on different platforms.

**Mary Jander**

consultant with the London-based Sema Group and Chair of the IEEE 802.1 Network Management Task Group, which approved CMIP over Logical Link Control protocol (CMOL) this year, is among the nay-sayers. He believes that CMIP is more efficient and flexible than SNMP and better suited to international use because of its endorsement by groups like the ISO and the IEEE.

"I think the choice between SNMP or SMP and CMIP is clearer than that between SNMP and SMP. There are many advantages to CMIP; it's more object-oriented and goes beyond a simple database approach."

He points out that CMIP easily deploys functions beyond the reach of SNMP. For example, a reset button can be directly programmed into a CMIP agent; SNMP, to do the same thing, needs to have a MIB element created that turns on and off in the presence of certain conditions.

But moving to CMIP from SNMP won't be as smooth as going from SNMP to SMP. According to Herman, the shift to SMP "really isn't that big a deal, since you're using the same MIBs in both cases. But going to CMIP is more difficult since the structure of its management information is different from that of SNMP or SMP." That means that the software used to translate CMIP into the format used by the management station would have to be revamped. Also, applications would have to be changed to accom-

modate the broader range of information available in CMIP MIBs.

Ultimately, it looks as if the future of network management belongs to both CMIP and SMP — albeit not in equal measure. The most general feeling in the industry is that the SMP upgrade won't put a damper on SNMP's popularity. But devotion to SNMP hasn't made users and vendors forget CMIP. In government and carrier applications, and in the international market, CMIP is growing, albeit slowly.

The strategies of some of the leading management platform vendors bear this out. IBM and HP, for example, are committed to SNMP and CMIP. Both recently added support for CM-SAPI (consolidated management application program interface) to their systems — IBM to AIX Netview/6000 and HP to Openview.

Other vendors are adding SNMP to their CMIP systems. Data General and Digital Analysis have co-developed a management system called OS/Eye Node designed for CMIP that also uses SNMP. And the Concert system developed by BT (formerly British Telecom), which is now being used mainly to manage its own networks, also delivers SNMP as an add-on to CMIP.

*Mary Jander is Network Management and New Products Editor for Data Communications magazine.*

# HOW TO AVOID BRIDGE/ROUTING "OVERKILL"



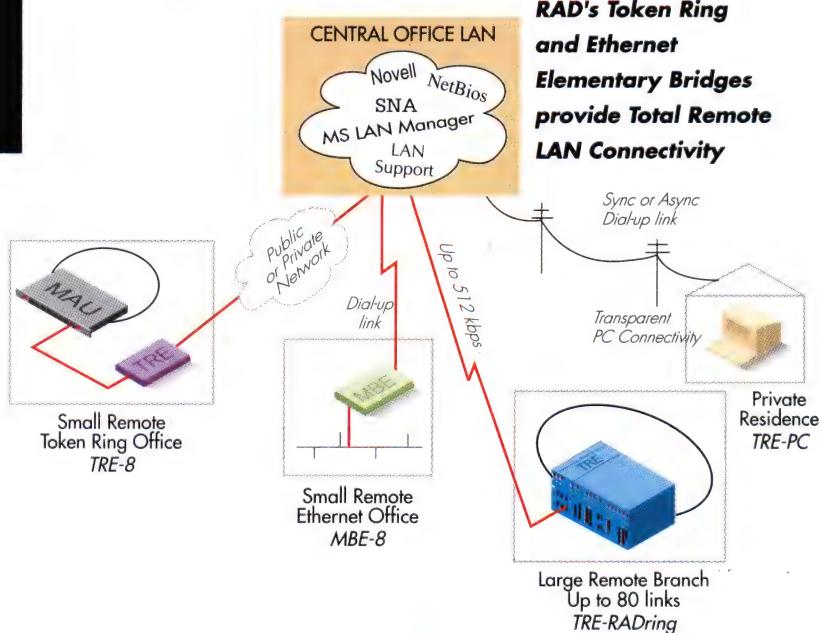
## Introducing Remote LAN Connectivity at its Simplest

Expensive bridge/routers may be ideal for crowded, meshed networks. But they're "overkill" for many remote LAN access applications. RAD offers a unique, low-cost no hassle solution to transparent remote connectivity – the Elementary Bridge. Whether you need to connect a single workstation or remote LANs consisting of many workstations, the Elementary Bridge provides true access to the central LAN.

No other remote access method offers all these features:

- \* Sync or async 4.8 kbps – 512 kbps communication links
- \* Available as a stand-alone, a PC card or as a module in an intelligent hub
- \* Support for 1 to 80 remote users
- \* Protocol and NOS transparent
- \* True LAN access
- \* Central management and security
- \* Token Ring or Ethernet

Beat the crowds. Call or fax your nearest RAD office or RAD distributor today for more information about using low-cost Elementary Bridges for remote LAN access.



**RAD**

**data communications**

**Intl. Headquarters**  
Rad Data Communications  
8 Hanechoshet Street  
Tel Aviv 69710, Israel  
Tel: 972-3-6458181  
Fax: 972-3-498250

**Australia**  
Dataplex PTY Ltd.  
234 Whitehorse Road  
Blackburn, VIC, 3130  
Tel: (03) 210 3333  
Fax: (03) 210 3399

**New Zealand**  
Dataplex (Sydney)  
Level 6, Eastgardens Office Tower  
Bunnerong Rd. & Wentworth Ave.  
Pagewood, NSW, 2035  
Tel: (02) 349 3911  
Fax: (02) 349 7747

Argentina (1)3436601, Australia (3)7353333, Austria 222.601011698, Belgium (15)290400, Brazil (2)12469708, Bulgaria (2)725010, Canada 416-4779977, Chile (2)5568390, China (1)2010690, 852.8922288, Colombia 6110111, Czechoslovakia 422-366251, Denmark (42)915555, Finland 0 8036033, France (1)47118300, Germany (89)3189910, (89)16068, Greece (1)6547400, Hong Kong 5617700, Hungary (1)186-8004, India (1)1243092, (81)2133415, Ireland (1)619066, Italy (2)27422565, Japan 3.52757910, Korea 972-3-6458181, Mexico 6828040, Netherlands 10-2620133, New Zealand (9)3796882, Norway (2)680650, Panama (2)13835, Paraguay (21)490076, Peru (14)333410, Philippines 2.8125068, Poland (2)6280627, (58)210818, Portugal (1)8519980, Russia (095)2054749, Singapore 4792088, Slovenia (61)122281, South Africa (11)8862200, Spain (16630100, Sri Lanka (1)573692, Sweden (8)6260650, Switzerland (14)917744, (22)3431150, Taiwan (2)7716333, Thailand (2)2332261, Turkey (1)2746894, U.K. 908 262121, Uruguay (2)900301, Venezuela (2)7624624.

# Introducing Ethernet hubs that let you buy what you need now and add on later.

When you buy an

Ethernet hub from SynOptics, you buy into a com-

plete line of Ethernet solutions. A line that lets you grow from small,

unmanaged hubs to highly-integrated, multi-segment hubs. ➤ If all you

need is basic connectivity, our

LattisLink™ hub is perfect for 16-node networks.

➤ If you need more, our LattisHub™ solution lets you

start small and add management capabilities and capacity for

up to 80 users. ➤ And our LattisSwitch™ System 3000 hub offers up to five Ethernet segments with integrated

switching. An extension of our LattisNet® System 3000, it

also provides a platform for integrating in Token Ring and

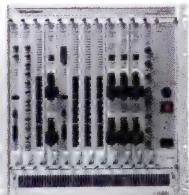
FDDI networks. ➤ Our network management software grows

with you, too. We offer Lattis EZ-View,™ for IP and Novell IPX

networks, as well as more advanced solutions for UNIX and

DOS platforms. ➤ To learn more, call 008-81-7070.

And see why so many people are networking with SynOptics.



Our LattisLink™ hub for up to 16 users, our scalable LattisHub™ for up to 80 users and LattisSwitch™ System 3000, our five-segment Ethernet hub with internetworking capabilities.

*Please send me a copy of SynOptics FREE video "The Complete Ethernet Hub Solution."*

Name \_\_\_\_\_

Title \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

*Send to: SynOptics Communications  
Australia Pty Ltd. SynOptics House, Units 2 & 3, 79-83 High Street, KEW, VICTORIA 3101.  
Or fax us: (03) 853-0473.*

 **SynOptics**

# Grading Smart Hubs for Corporate Networking

Smart hubs stand the best chance of evolving into the primary platform for corporate networks. But do the current offerings have what it takes to support enterprise networks?

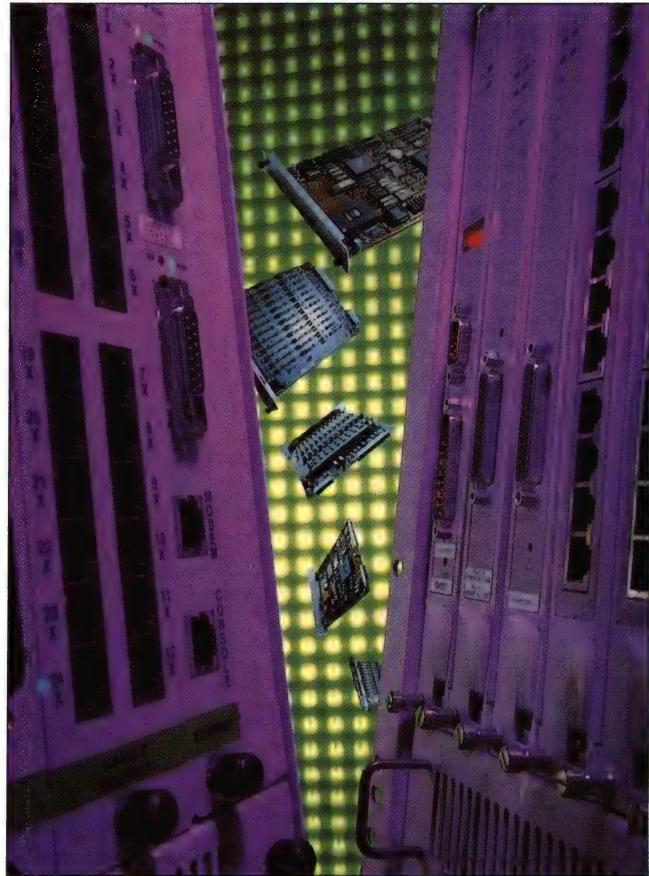
The word on the street (and in just about every networking magazine and trade weekly) is that smart hubs are going to be the basis of tomorrow's internetworks. But talk, so the saying goes, is a heavily discounted commodity. Even network managers with the gift of gab and a touch of the blarney need something more substantial to go on. The US-based Data Comm Test Lab is ready to give it to them: The industry's first hands-on evaluation of smart hubs as building blocks for the enterprise. In an attempt to separate hard facts from hearsay, the Lab checked out five high end hubs from leading vendors Cabletron Systems, Chipcom, Lannet Data Communications, SynOptics Communications, and Ungermann-Bass.

From the start, the Test Lab wanted to supply more than a simple checklist of features and functions. Smart hubs already make it possible to structure wiring so that reliability is part of network design. But if they're going to grow into their internetworking reputations, they'll have to do far more. For that reason, only boxes that handle Ethernet and Token Ring were evaluated (see Table 1 on page 82). Corporate networks will increasingly incorporate both. Hub capacity was given an equally critical treatment in order to determine if a box's backplane can accommodate all the topologies and segments likely to be found on an enterprise. And hub management was evaluated exhaustively from an internetworking point of view: A product's ability to configure its own ports does not qualify it for full-blown network management. At the same time, user interfaces and ease of use (both admittedly subjective considerations) were carefully scrutinised.

Just as important — if hubs are to move into the central slot on the corporate internet — is their ability to keep the network up and running when individual nodes malfunction. Finally, the Lab gauged each hub on its basic features, ranging from support for different types of media to redundant components for fault tolerance.

Veterans of other Data Comm Lab Tests will likely note the absence of one familiar criterion: Performance. Bridges, routers, gateways, and similar gear are judged, at least in part, on their ability to process and pass along packets. The ideal hub, however, is invisible. It interferes as little as possible with data flowing through it. Thus, measuring transit times serves no real purpose.

Hubs alone out of all the internetworking gear tested over the past few years stand the chance of evolving into the primary platform for corporate networks and network computing for the rest of the decade. Indeed, they could ultimately form the heart of the enterprise, just as the mainframe and its associated peripherals did for earlier configurations.



Given this near-unqualified endorsement of smart hubs, the Lab is pleased to bestow its first two Tester's Choice awards ever given to this technology. One goes to the MMAC from Cabletron; the other, to the Lattisnet 3000 from SynOptics. Both products are well on the way to defining suitably equipped platforms for corporate networking. And the Test Lab also is pleased to note the high quality of all the products evaluated: Network managers choosing to work with any of them won't go wrong.

**Table 1: Smart Hubs: Knowledge is Power**

| VENDOR   | PRODUCT                           | AVAILABLE CHASSIS  | NETWORK SUPPORT                                | MAXIMUM NETWORK SEGMENTS PER CHASSIS                                | MAXIMUM BACKPLANE CHANNELS PER CHASSIS  |
|--|-----------------------------------|--|--|---|---|
| <b>Cabletron Systems</b><br>(02) 878 5777  | MMAC-8FNB                         | MMAC-3 (3 slots),<br>MMAC-5FNB (4/5 slots),<br>MMAC-8FNB (8 slots) | Token Ring,<br>Ethernet,<br>FDDI,<br>Localtalk | 7 of any supported network  | 3 Ethernet,<br>1 Token Ring,<br>1 FDDI, 3 Localtalk                             |
| <b>Chipcom</b><br>(02) 416 0653  | Online 5017C                      | Online 5006C (6 slots),<br>Online 5017C (17 slots)                 | Token Ring,<br>Ethernet,<br>FDDI               | 16 Token Ring,<br>16 Ethernet,<br>4 FDDI                            | 3 Ethernet,<br>7 Token Ring,<br>4 FDDI  |
| <b>Lannet Data Communications</b><br>Toren (03) 242 5050<br>Dataplex (03) 210 3333 | LET-36                            | LET-3 (3 slots),<br>LET-18 (18 slots),<br>LET-36 (36 slots)        | Token Ring,<br>Ethernet,<br>FDDI,<br>Localtalk | 18 Token Ring,<br>or 36 Ethernet,<br>or 18 FDDI,<br>or 18 Localtalk | 2 Token Ring,<br>4 Ethernet, 4 FDDI,<br>4 Localtalk                             |
| <b>SynOptics Communications</b><br>(03) 853 0799                                   | Lattisnet Model 3000 Concentrator | Model 3000 (14 slots),<br>Model 3030 (4 slots)                     | Token Ring,<br>Ethernet,<br>FDDI,<br>Localtalk | 12 Token Ring,<br>or 1 Ethernet,<br>or 3 FDDI,<br>or 12 Localtalk   | 2 Token Ring,<br>1 Ethernet, 3 FDDI,<br>4 Localtalk                             |
| <b>Ungermann-Bass</b><br>(03) 696 2006   | Access/One ASE-3000               | ASE-2000 (2 slots),<br>ASE-3000 (5 slots),<br>AE-7000 (11 slots)   | Token Ring,<br>Ethernet,<br>FDDI,<br>Localtalk | 5 Token Ring,<br>or 4 Ethernet,<br>or 5 FDDI,<br>or 4 Localtalk     | 0 Token Ring (made via ring in/ring out),<br>1 Ethernet, 1 FDDI,<br>1 Localtalk |

CMIP = Common Management Information Protocol  
FDDI = Fibre Distributed Data Interface

SDLC = Synchronous Data Link Control  
SNMP = Simple Network Management Protocol

## Plugging the Product

Simply defined, a hub is whatever is plugged into it. This unparalleled flexibility makes it possible to view the hub as a sort of ultimate platform. With the addition of a router module, a hub can open a link to the wide area. Add-in cards loaded with Unix workstations or PCs can transform it into a departmental server. Likewise, other add-ins allow a hub to support almost any type of network or media. And once a network management card is slotted in, a hub offers an unprecedented view of the data flowing across the enterprise.

Further, no matter what role it assumes, a hub always makes it easy to establish connections between add-in cards (usually via its backplane). It thus can serve as a unifying point in a diverse environment — another reason why the hub will eventually assume the central position in internetworking.

It's important to note the future tense in the foregoing assessment. Hubs may be well on the way to becoming the focal point of future networks, but they're not there yet.

On the plus side of the column, the underlying architecture of all the hubs tested can accommodate large networks — say, with 10 or more linked LANs and hundreds or possibly even thousands of end-nodes. What's more, all of the boxes could isolate a faulty Ethernet port and keep it from bringing down the entire network. Four of them could do the same for Token Ring.

On the minus side, the net management offered by these hubs is still rudimentary. Most systems can capably configure all of a

hub's ports, but few can supply the MAC (media access control) — layer address of a node (fairly basic stuff, actually). And while net management user interfaces were generally able to draw pretty network maps, they were hardly intuitive: Working with them meant frequent referrals to manuals or calls to tech support.

## Smart Thinking for Smart Hubs

Given the great things expected of smart hubs, the sometimes startling differences among features and functions, and the difficulties involved in choosing from a market already crowded with 50 or more vendors, the Lab believes that users and vendors are going to need all the guidance they can get.

To start with, vendors need to stop confusing the issue by talking up their long-range strategies at the expense of all else. ATM (asynchronous transfer mode) backplanes and multimedia support may be sexy sound bites, but they're not going to do much for customers concerned with a hub's fundamental ability to connect point A with point B. Even FDDI still seems to be beyond most customers' concerns, which is one reason the Lab did not test this capability.

Supporting Ethernet and Token Ring in one box, though admittedly less dramatic than an ATM backplane, is a must on most internetworks. Yet only a few vendors outside of the six tested, can actually do so — among them, Fibermax and Star Tek. Even leaders in the Ethernet or Token Ring market are lacking here. For example, long-time Ethernet champion 3Com has yet to ship Token Ring, while Proteon, a prime player

in Token Ring, was just introducing Ethernet in November last year.

The big computer vendors who tout their role as systems integrators are not much better. IBM just announced in September last year that it would supply Token Ring/Ethernet hubs by reselling Chipcom products; DEC and Hewlett-Packard support only Ethernet in their hubs.

Of course, 'support' is a very slippery word. A vendor that says it supports Token Ring and Ethernet may not be able to manage both at the same time. A vendor that supports FDDI may only be able to do so if Token Ring is not installed.

Overall, however, most vendors deliver what they promise. And claims were much more in line with capabilities than in other markets. In the past, for example, the Lab has uncovered astonishing inaccuracies in the claims put forward by bridge and router vendors.

The Lab also noted that Token Ring typically lagged behind Ethernet. Since hub vendors are chiefly drawn from the Ethernet world, this is not very surprising. Eventually, Token Ring will catch up.

Another of the Lab's concerns is that most of the add-in internetworking devices now offered by smart hub vendors, including bridges and routers, are engineered and manufactured by the vendors themselves. In most cases, the hub maker purchases the requisite technology from a third-party supplier. It would be far better if hub makers published the interfaces to their products so that independent manufacturers of internetworking gear could build modules to spec.

| MAX. PORTS PER ADD-IN CARD                                 | AVAILABLE MODULES   | NETWORK MANAGEMENT | REDUNDANT POWER SUPPLY | HOT SWAPPING |
|--|---|--------------------|------------------------|--------------|
| Token Ring: 24<br>Ethernet: 26<br>FDDI: 7<br>Localtalk: 24 | Bridge, router, management, Lantern LAN analyser, Sun workstation, Silicon Graphics workstation, SDLC converter | Unix-based, SNMP   | Yes                    | Yes          |
| Token Ring: 20<br>Ethernet: 12<br>FDDI: 2                  | Bridge, router, management  | Unix-based, SNMP   | Yes                    | Yes          |
| Token Ring: 10<br>Ethernet: 14<br>FDDI: 4<br>Localtalk: 8  | Bridge, management  | Unix-based, SNMP   | Yes                    | Yes          |
| Token Ring: 12<br>Ethernet: 24<br>FDDI: 4<br>Localtalk: 16 | Bridge, router, management, Kalpana Ethernet switch, Sun workstation, LAN Analyser (runs in workstation)        | Unix-based, SNMP   | Yes                    | Yes          |
| Token Ring: 12<br>Ethernet: 12<br>FDDI: 6<br>Localtalk: 16 | Bridge, router, management, PCs via Access/Open   | OS/2-based, SNMP   | Yes                    | Yes          |

The bridges and routers created by a hub maker, for instance, typically can't match the features, functions, and prices of third-party products.

## The Heart of the Hub

When reduced to essentials, a hub consists of a chassis (backplane) that accepts add-in cards or modules. The simplest add-in cards are those equipped with LAN ports. In a rudimentary configuration, cable runs from a desktop to a LAN port, which means that the hub structures both Ethernet and Token Ring LANs as a physical star. Typically, all of the users connected to one add-in card are considered to be on the same logical LAN segment. More than one card can be linked through the hub backplane to establish larger segments.

LAN modules, of course, are only the beginning: Add-in cards also carry bridges, routers, network management systems, protocol analysers, and single-board computers and Unix workstations. It's possible, say, to connect one LAN card with another through a bridge module, rather than directly via the backplane, thus segmenting a network more efficiently and boosting performance. And by mixing and matching add-in boards, network managers are afforded near-unlimited flexibility in network design.

Since it establishes the actual physical and electrical connectivity between add-in boards, the backplane is the foundation for not just what the hub is but what it can become. The backplane is thus one of the most important criterion on which a hub can be judged. But understanding the backplane

is not easy. Every hub (and thus each backplane) is proprietary. Worse, there's no widely accepted terminology to describe various implementations. One vendor's 'passive' approach is another's 'active' design.

## Backplanes for Beginners

For starters, it's possible to think of a backplane and add-in boards as roughly analogous to a PC bus and its interface cards. The data path from card-to-card-to-card across a backplane is often called a 'channel,' and many vendors use this term to refer to the physical and logical attributes of a particular backplane connection.

Although it is always referred to in the singular, the backplane typically consists of separate physical channels between cards (this is where the analogy with the PC bus ends). The existence of separate physical channels rather than one high speed backplane is a result of the evolutionary approach that vendors have taken. Many hubs began as Ethernet-only. In order to support another LAN, vendors chose to add a channel rather than introduce a new box.

Unfortunately, this generally means that once all the pins on the backplane have been assigned, in order for vendors to add new types of LANs they must redesign the backplane. Thus, customers who wish to add new types of LANs must buy a new chassis.

Several vendors, however, have come up with clever workarounds — in essence, physically dividing the backplane at several points so that it can support a wider range of LANs. For instance, certain pin receptacles on slots 1 and 2 could be dedicated to Ether-

net, while the same receptacles on slots five and six could be used for FDDI. Cabletron offers this feature.

## A Question of Capacity

Capacity is a critical concern when judging a hub, since it dictates whether a product can support as many networks and nodes as needed. Here again, complexity is the name of the game. Capacity is governed by a number of variables, including the maximum number of LAN segments allowed and whether ports can be assigned individually to different segments. Vendors often define capacity by stating the total number of ports that can be accommodated, but such figures are generally almost worthless or hopelessly optimistic. All too often, users can attain comparable numbers only without network management or when working with either Ethernet or Token Ring, not both.

The real key to capacity is determining how many LAN segments a box can handle — often, a tricky evaluation to make accurately. At the very least, a hub will accommodate one LAN segment for every channel on the backplane. Vendors typically furnish at least two Token Ring channels; three or more Ethernet channels are the norm.

By dividing up the backplane, though, it's possible to extend the number of channels. Although Cabletron offers only one physical Token Ring channel, it accommodates at least three backplane-based Token Rings via segmentation. Using DIP switches on the hub cards, a network manager can physically segment the single Token Ring channel into two or three rings. Cabletron's backplane, in fact, allows any and all channels to be segmented arbitrarily.

Another variable affecting hub capacity is whether the backplane allows so-called adjacent connections. These make it possible for two or more cards slotted side by side to bypass the backplane and form a separate LAN segment. Lannet Data Communications and Cabletron offer this feature.

And if all the channels are used up, it's still possible for an add-in board to be its own segment or for the ports on the add-in board to be connected with other add-ins through internal or external bridges to form a segment. The ring-in/ring-out connections on Token Ring modules could also be used to create Token Ring segments, made up of cards in the same box or in different hubs.

## That Empty Feeling

The number of segments available can also often be a function of proprietary design. On Cabletron's backplane, for example, add-in cards cannot communicate if there is an empty slot between them. If there were a Token Ring card in slot 1, Ethernet card in slot 2, and Token Ring card in slot 3, the two Token Ring cards would not be able to communicate if the Ethernet card were removed. Add-in boards must thus always be loaded from right to left without skipping a slot in

## Table 2: Beacon Isolation

| VENDOR    | AVERAGE RANGE (SECONDS) |
|-----------|-------------------------|
| Cabletron | 9.5                     |
| SynOptics | *                       |
| U-B       | 6.6                     |

\* The SynOptics algorithm always takes more than 20 seconds on the first pass but far less time on each subsequent pass. An average is not an accurate representation of performance.

Cabletron's hub. Because of this limitation, segments could temporarily disappear in a Cabletron hub as network managers perform normal maintenance. Cabletron says that it will soon ship a backplane upgrade that resolves this problem.

Other sorts of restrictions can also affect the number of LAN segments. While hubs offer many more slots than channels, some add-in cards must be accompanied by other boards. Typically, a management module must be slotted in for every segment.

Once all the foregoing has been factored in, network managers are almost home free when it comes to determining how many LAN segments a hub can handle. The final issue that must be accounted for is whether a hub allows net managers to allocate ports on add-in cards to different segments.

By convention, hubs treat all the ports on a card — and hence all the data from these ports — as a single logical entity. (Add-ins usually have from one to 24 ports.) This means that when a LAN segment is created between cards, all of the data originating on one card travels across the backplane to its partner. Some vendors, however, implement port switching, which allows any port on a card to be connected independently to various LAN segments. Chipcom alone of the vendors tested offers this feature (on its Ethernet boards). The 7700 Hub from Bytex was one of the first to support port switching.

It should be clear that a port-switching hub is more flexible than its traditional counterparts, enabling network managers to increase the capacity of a specific segment serving one set of users by allocating unused ports on a card serving other users. Without port switching, the only way to increase the capacity of a specific segment would be to add another card.

## Missing Management

If hubs are to truly come into their own as internetworking platforms, their network management capabilities will need to be nothing short of superb. Sad to say, this is the area where vendors must do the most work. From the very basics — status lights and labels — through the management modules and software platforms, to the complex user interfaces, confusion reigns supreme.

The problem is not a paucity of offerings but too many choices. When queried, nearly every vendor is happy to rattle off a list of just about every net management system, platform API (application program interface), and graphical interface the Lab has heard of: Openview, Sunnet Manager, Distributed Management Environment (DME), Netview, SNMP, CMIP, PCs, RISC workstations, Presentation Manager, Windows, Motif, and so on. And alternative strategies and options seem to be the order of the day.

Worse, each vendor specifies its own approach to tying all this together and performing the most basic functions, even when underlying platforms are identical. Try as it might, the Lab was not able to identify any set of unifying principles for hub-based network management.

It isn't just that the situation is confusing for users or that it makes managing multi-vendor networks even more difficult. After talking extensively with vendors, the Lab came away with the distinct impression that they're as confused as their customers. Rather than sort through the issues and come up with a workable industry-wide strategy, they look to be trying to cover all the bets.

## A Magical Mystery Tour

It sometimes seems as if the idea is to make these smart hubs as mysterious as possible. For instance, only Cabletron went to the trouble of clearly labelling its modules. Token Ring cards are designated as such, and other cards follow suit. Lannet and others are content to use acronyms or model numbers.

Hub status lights, as the name suggests, should make it easy to figure out what's going on with a box. Green for normal conditions and red for malfunctions would seem like a no-brainer, but only SynOptics uses indicators that are easy to understand. Some vendors want network managers to count the number of times an LED blinks or identify a flashing pattern to determine network conditions. Worse, the Access/One from Unger-Bass offers users no status indicators. Since the cables on the U-B box attach through the back, determining network configuration at a glance is more a guessing game than a job for skilled technicians.

The same sort of bewildering variety can be seen in the network management modules that hub vendors supply. These cards are responsible for collecting node address and statistical information, as well as for isolating malfunctioning nodes and detecting collisions. Often, a separate module is needed for each type of network, and most management cards can usually oversee only a single segment. That can drive costs through the roof. And management modules can quickly use up valuable slots.

To help boost the price/function ratio, some vendors — Cabletron among them — are integrating local Ethernet and Token Ring bridges into their network management modules. Once two segments are linked via

bridge (something most users want to do anyway), only one net management module is needed.

## Inside and Out

Hub management software can be run either on a PC add-in card or in an external computer. SynOptics and Cabletron offer add-in cards. The Network Control Engine from SynOptics is based on a Sun Sparcstation. It runs both SynOptics' net management software and advanced applications from the vendor and third parties that analyse network traffic, isolate faults, and so forth.

Cabletron sells a Silicon Graphics workstation on a card that runs the hub maker's Spectrum net management software as well as numerous third-party applications — including packet capture and analysis. The LAN analyser function is available only for Ethernet segments. In general, the more powerful the platform on an add-in card, the better. With enough power, there is almost no limit to the functions that can be added to a hub.

All of the hubs tested can be managed via external platforms connected via a LAN or an EIA-232 port. Everything from simple VT100-style hub administration to programs based on Windows, OS/2, or Unix is available. But the undisputed platform of choice for high end network management is a Unix workstation from Sun Microsystems. Cabletron, SynOptics and Chipcom offer Sun workstations for their high end net management software.

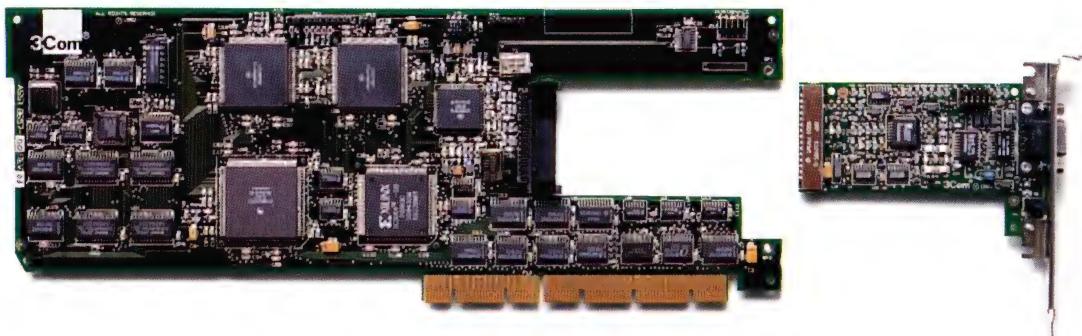
## The Software Shortfall

It's too bad that most net management software doesn't live up to the hardware that it runs on. Too many hub vendors seem to define network management as hub port administration. This means that the software makes it possible to turn ports off and on and, in some cases, gather some basic statistics about devices communicating through a port. That's a start, but it's not network management, which includes gathering information about which protocols are running on a given segment and exporting such information to a database for network planning.

Another problem: All too often, when a fault occurs and the icon on the hub's network management console turns red, operators are left to figure out what went wrong on their own. True network management should apply some intelligence to help resolve the problem, rather than simply telling the net manager something has gone awry.

At the least, consoles should use filters to help determine the actual reason a fault has occurred. When one device goes down, it typically causes a number of bogus faults to be generated from devices that normally communicate through it. If the management console understands the devices and the faults, it should be able to filter out false alarms and bogus alerts. That would save network managers from going nearly blind

# Think of this as the match that lit the fuse that started the FDDI revolution.



*FDDILink's unique "PMD" module design makes changing media a snap.*

Every revolution has its moment of truth. For FDDI, that moment is now.

Introducing 3Com's FDDILink™ family of 32-bit EISA adapters. They bring blistering FDDI performance to your network for as little as \$2,500. That's up to half the cost of comparable adapters.

And that's not all. Backed by a lifetime warranty, the FDDILink family gives you the flexibility to ease your network into FDDI, at your own pace. Thanks to their unique "PMD" module design, FDDILink adapters can be used with shielded twisted-pair cable or fiber-optic cable. And even with unshielded twisted-pair when standards are finally approved. Simply plug in the appropriate media module.

Now you can let the high-powered hardware and software on your network perform at its full potential.

That's because FDDILink can deliver 100 Mbps performance to the desktop using lower-cost shielded twisted-pair copper cable and connectors.

And what's even better, when you add 3Com's NETBuilder® II Routers and LinkBuilder® 3GH Hubs, you have a total solution that runs all the way from the desktop to the WAN.

But that's enough talk. For FDDI revolutionaries, this is a time for action. Call **(02) 959 3020, ext. 22**, or contact your nearest 3Com distributor.



***Networks That Go the Distance™***

Tech Pacific Australia  
(02) 697 8666

Tech Pacific New Zealand  
(09) 415 8300

MM Data Networks Australia  
(02) 980 6922

BICC Communications New Zealand  
(09) 358 0322

i.t. connXions Australia  
(02) 415 0555

searching through fault logs trying to figure out what really happened.

## Pretty as a Picture

One favourable thing can be said about just about all the graphical user interfaces the Lab peered into: They're pretty. But beneath the attractive facade, bad design seems to be the order of the day. For one thing, the way that most screens are cluttered with objects makes it almost impossible to discern anything at a quick look. For another, the detailed representations of hub components don't always match what the component really looks like. Nor is it always clear where users should click or what function logically follows the one being performed.

Ultimately, the Lab found that one of the most useful interfaces wasn't graphical at all: The character-based screens and menus on U-B's Access/One were far easier to use. On the other hand, despite U-B's stated intent to go hard after IBM accounts, its interface blatantly violates IBM's SAA Common User Access specification.

The help screen furnished by most of the net management systems also turned out to be less than helpful. Messages in dialogue boxes that were supposed to assist with a problem often ended up simply restating the original message in more words. At startup, for instance, Lannet's LET-36 displays 'Enter the IP address for the node.' Clicking on Help yielded the hardly edifying message, 'You must enter an IP address for the node when you are starting the management system.'

Finally, if hubs are to serve as enterprise building blocks, they'll need to manage more than just themselves. SNMP is part of the answer, since it makes it possible for users to browse through and alter parameters specified in the management information bases (MIBs) I and II. But that's not enough. All vendors of internetworking gear have implemented proprietary extensions to both MIBs. Without support for such extensions, a hub's management system can supplant the system supplied with internetworking gear. Once again, only Cabletron is on the ball in this area. It supports the proprietary extensions implemented by router vendors such as Cisco Systems, Proteon, and Wellfleet Communications — among others.

## Up and Running

Token Ring and Ethernet LANs implemented with MAUs (multiple access units) and passive hubs have been plagued by downtime from the start — chiefly caused by a malfunctioning station that brings down the entire network. Indeed, that's one of the reasons that net managers turned to smart hubs to structure LANs, since they can isolate malfunctioning nodes and contain the damage.

Token Rings can be rendered inoperable by some very simple problems. Plugging a 16Mbps LAN adaptor into a 4Mbps LAN,

or vice versa, crashes the entire ring. A user on the ring who mistakenly plugs a Token Ring DB-9 connector into a CGA graphics card rather than the LAN adaptor board can also bring down the network. And even poor-quality UTP (unshielded twisted-pair) wiring strung over a fluorescent light can cause intermittent failures.

When any of these problems occurs, the LAN workstation next to the malfunctioning node stops receiving data and starts to 'beacon,' sending out a data packet notifying all stations that a severe error has occurred. Basically, this is the station's way of telling the rest of the network that it can't hear anything. The IEEE 802.5 Token Ring specifications do not include a way for a network to recover from a beaconing condition. The only way to recover is to remove the malfunctioning station. But some smart hub vendors have developed proprietary algorithms that can speed recovery. Simply put, the hub first detects that the network ring is down; its recovery algorithm then kicks in to find the malfunctioning station and disconnect it from the ring.

## Bracketing the Beacon

To evaluate a hub's ability to isolate a malfunctioning station, the Lab connected two plug-in modules via the backplane. Stations were inserted onto the first and last ports on each module, and a malfunctioning station was inserted into the penultimate port on one of the modules. The Lab then recorded the time from initial insertion to isolation, using a protocol analyser whenever possible (see Table 2 on page 84).

Since the isolation and recovery algorithms generally work by shutting down a port or set of ports (the algorithm may keep cutting a network in half until the beaconing node is found), it was entirely possible that the node hosting the protocol analyser would be turned off. For that reason, the Lab also timed the interval with stopwatches.

It is crucial to detect the beaconing station and isolate the associated port as quickly as possible to protect user sessions. Of the vendors offering Token Ring isolation, Cabletron and U-B were able to wrap around the beaconing port in under 10 seconds. SynOptics took longer in some cases. The company says that the extended period is because its hub is doing additional tests to accommodate older Token Ring adaptors in users' PCs. In addition, SynOptics made it possible to reset the port automatically after a user-specified period. Ports on all the other hubs must be manually reset from the net management console.

Periodically restarting the port makes sense, since it is possible for a beaconing condition to clear up on its own. But if the problem persists, the port will have to be shut down again, a process that could momentarily interrupt the Token Ring.

Some hubs also can detect beaconing when it is coming from a station connected

to an 8228 MAU that has been linked to it. A company migrating from 8228s to hubs could thus link the ring-out connection on an 8228 to a port on the hub to form one network. This enables MAUs to be used in conjunction with smart hubs. U-B hubs can isolate an 8228.

Port isolation will doubtless be further refined in the future. Cabletron and SynOptics are already working on detecting and isolating a port set to the wrong speed before it can cause any trouble. By monitoring the wrap test that Token Ring nodes perform before inserting themselves into a network, these vendors can determine whether the node is transmitting at the correct speed. The Lab tested a beta version of the Cabletron enhancement and found that the procedure worked flawlessly.

Faulty nodes can also bring down an Ethernet LAN. Problems on Ethernet adaptor boards, for instance, typically result in collisions on the network. While a certain number of collisions are common and acceptable, when they become excessive they hamper throughput and may indicate a faulty adaptor. Unlike beacon isolation tests, which are complex and implemented differently by all vendors, collision detection is straightforward. All hubs tested monitor Ethernet ports; if 32 consecutive collisions are detected, they assume the port is faulty and turn it off.

## Fundamental Features

Scalability, media support, and fault tolerance are among the other issues that must be considered if smart hubs are to be used as the basis of corporate networks. During the past year, a number of hub makers have introduced scaled-down versions of products already on the market. At this point, most vendors sell several versions of their hubs, distinguished by the size of the chassis (the larger the chassis, the more slots for add-in boards). Like bridge and router vendors, hub suppliers seem to have realised that corporations operate a vast number of small remote sites. They're thus focusing their efforts on automating these sites and integrating them with the corporate network. Opting for a small chassis is not a problem, though, since all add-in cards can be used again if a larger hub is needed later at a specific site.

All the hubs tested support as many types of media as will likely be found on the typical corporate net: Thick and thin Ethernet, 10Base-T, Ethernet over fibre, Token Ring over shielded and unshielded twisted pair, and FDDI are just some of the options.

One question about hubs is whether the add-in cards for 16Mbps Token Ring over UTP can support the maximum number of nodes and distances called for by the Token Ring standard. Crosstalk and jitter may degrade signal quality below the point at which the ring can remain in service as distances and nodes approach the maximum. The Lab

did not test the hubs to answer this question. Most users play it safe by not coming close to either limit.

Fault-tolerant hardware is also important. Hardware failures caused by normal wear and tear or improper handling and operation can easily disable a network. Among the common fault-tolerant features found on the hubs tested are redundant power supplies (in some cases, dual power sources are accommodated) and hot-swapping for add-in boards. This allows users to replace a faulty card without bringing the entire hub down. The hot-swapping feature is not always available for all modules, though. Cabletron's network management module, for example, does not allow hot-swapping.

## It's in the Cards

The range of available add-in cards and modules is also an important factor when evaluating a smart hub. All the vendors tested sell add-in Ethernet cards with repeaters. Most all sell local Ethernet bridges and local Token Ring bridges. Cabletron and SynOptics also sell routers.

As noted, hub vendors have developed their bridges and routers in-house, with the help of third-party suppliers. Cabletron's Token Ring bridge is based on code from Madge Networks. Cabletron and SynOptics

have worked with Cisco to build routers for their hubs. Lannet bridge modules are based on technology from sister company RAD Network Devices. U-B sells its own 4Mbps Token Ring bridge based on Olicom's software and routers incorporating technology from Advanced Computer Communications.

Other modules include add-in boards loaded with LAN analysers. Cabletron, for one, sells an Ethernet-only add-in version of Lantern from Novell. Most vendors indicate that they intend to implement the Remote Monitoring (RMON) MIB in their management modules in order to deliver protocol analysis — if they haven't already done so.

Cabletron has a version of the SNA/Token Ring Converter (SNA/TRC) from Sync Research to connect IBM communications controllers to the hub. Cabletron also supports SDLC devices, as can SynOptics, via its add-in card loaded with the Ether-switch from Kalpana. Cabletron and SynOptics also sell Unix workstation modules.

None of the five vendors have PC add-in cards. Such cards are crucial because they host PC-or Unix-based bridge and router programs from such companies as Novell or Eicon Technology; PC-based LAN analysers from the likes of FTP Software and Triticom; and Unix-based management software like Netvisualiser from Silicon Graph-

ics. Even better, add-in computers can be used to host general-purpose server applications. A NetWare server, e-mail gateway, or distributed database could be installed in a hub. This would be a great help to network managers who need to keep applications physically close to departments but out of the way of curious or malicious users.

U-B does not sell a PC or workstation for its Access/One hub. Instead, it sells Access/Open, which consists of multiple PCs in a chassis. Access/Open links to Access/One via standard network connections and can be directly tied to the Access/One management station. Because it adds higher-level management to PCs linked through a hub, U-B's approach is a step in the right direction toward tomorrow's corporate networks.

U-B also gets high marks for its decision to divide their port cards into separate modules, joined by a proprietary connector. One module carries the physical connectors; the other, the interface circuitry. That makes it possible to replace interface circuits without unplugging a cable, making life much simpler for network managers. Other vendors should think of taking a similar tack.

---

*Kevin Tolly is Director of the Data Comm Test Lab and President of Interlab. He is based in New Jersey in the United States.*

## Lennon & McCartney

## Rolls & Royce

## Lillee & Marsh

## Gilbert & Sullivan

## Astaire & Rogers

## Hope & Crosby

## Torvill & Dean

## Holmes & Watson



## Successful Partnerships.

In the ultimate combination, 3Com and MM Data Networks have joined forces to supply you with the most comprehensive range of data networking and communications equipment available in Australia.

3Com has the widest range of solutions for LAN and WAN problems, with products including Adapters, Hubs, Bridges and Routers for Ethernet, Token Ring and FDDI technologies.

MM Data Networks, with more than 5 years experience in all aspects of networking, provides support services including Training, Network Design, Extended Warranty and Network Troubleshooting to streamline the implementation of your 3Com networks.

### Another partnership you'll never forget.

3Com and MM Data Networks - working together to meet your demands in Quality Products, Service, Support and Training to lead you through the 90's.

#### MM Data Networks

A DIVISION OF Metal Manufactures Limited  
Level 7, City View Office Estate  
423 Pennant Hills Road, Pennant Hills, NSW 2120

Head Office: Tel: (02) 980 6922 Tel: (03) 824 8711 Tel: (06) 243 5183  
Fax: (02) 980 6795 Fax: (03) 824 8302 Fax: (06) 243 5143

# CABLING MANAGEMENT & REFORM

24 & 25 March 1993 • Sheraton Wentworth, Sydney

## DAY ONE

9.00 **Opening remarks from the Chair.**  
Local and International cabling standards  
- Aims and directions  
NORM O'DOHERTY, General Manager, Compliance Branch, AUSTEL

9.15 **AS3080 - Understanding the impact and the two following standards on installation and administration**  
ROGER FAIRBAIRN, Chairman, IT17 Group, Standards Australia

9.55 **Possible new directions for Austel's regulation of building cabling**  
NORM O'DOHERTY, AUSTEL

10.55 **International Cabling Standards and new Directions**  
JOSEPH COFFEY, Member, TN-2948 Task Group, U.S.A.

## SELECTING A STRUCTURED CABLING SYSTEM

11.35 **The elements of structured cabling**  
GEORGE GEORGEVITS, Power and Digital Instruments

## CABLING OPTIONS FOR BACKBONE AND HORIZONTAL CABLING

12.15 **Category 3, 4 and 5 Cabling - Latest developments and issues**  
BARNEY TOMASICH, MM Cables Communication Products

2.00 **Fibre optics - Is it the answer or has copper technology caught up?**  
ROBERT GREEN, Technology Manager, Olex Cables Ltd

2.40 **Shielded vs Unshielded Twisted Pair**  
JOSEPH COFFEY, Manager Engineering, KRONE Inc, U.S.A.

## CROSS CONNECT OPTIONS

3.45 **Part A: Copper Termination and Cross Connect Systems**  
STEPHEN SMITHAM, MOD/TAP (Australia) Pty Ltd

4.15 **Part B: Fibre Termination and Cross Connect Systems**  
DEREK FORSYTH, National Products Specialist, 3M Australia

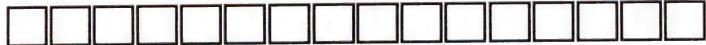
4.45 **Application of high speed cabling systems**  
DAVE DE PUY, Director, Crescendo Communications, U.S.A

5.30 Close of Day One

**Yes**, I would like to attend the CABLING Conference

Method of payment

Crossed cheque payable to AIC Conferences  Bankcard  
 Visa  Mastercard  American Express  Diners Club



Expiry Date ..... Signature .....

Registration Fee: \$1,195 per person for full two day conference. Fee includes lunch, refreshments and conference documentation. **Group discount:** For three or more participants from the same organisation, the fee is reduced, \$1,095. Payment is required with your registration. **Cancellations and Transfers:** Documentation and 50% refund will be given for cancellations received in writing one week before the conference. Full refund for cancellations received at least two weeks prior. AIC Conferences reserves the right to alter this programme without notice. **Training Guarantee Act:** This conference is a structured training course under the terms of the Training Guarantee Act.

**Conference Venue:** Sheraton Wentworth Hotel, 61-101 Phillip Street, Sydney Ph: (02) 230 0700.  
AIC Conferences Pty Limited A.C.N. 003 220 424

## DAY TWO

9.00 **Opening remarks from the chair**  
TRAL CASH, Managing Director, Kwasar Networks Pty Ltd

9.05 **The business case for implementing a structured cabling system**  
GRAHAM BELL, Lane Telecommunications Pty Ltd

9.45 **Designing, implementing and testing a structured cabling system**  
TRAL CASH, Kwasar Networks Pty Ltd

10.50 **Documentation and administration requirements for a structured cabling system**  
BRIAN SALT, MM Systems Engineering

## USER CASE STUDIES

11.30 **Cabling migration - Strategies for achieving cost effective migration**  
BELINDA BARTEL, Renison Goldfields Consolidated Ltd

12.00 **A campus network - The Royal Prince Alfred Hospital experience**  
ARNO FRANZ, Central Sydney Health Service

1.35 **Cabling for FDDI**  
WARREN TONEY, MOD/TAP W. Corp, U.S.A.

## NEW CABLING OPTIONS AND CONCERNS

2.20 **Wireless solutions: An alternative to cabling?**  
Senior Executive, Motorola, U.S.A. (Via videoconference)

3.25 **User and installer case study: Installing a wireless Lan**  
CHRIS MOLLOY, Manager, Cabling Systems, Cray Communications; Wireless User Client

4.00 **The cabling in your building - ownership and liability**  
PETER WATERS and PETER LEONARD, Partners, Gilbert & Tobin

4.40 Close of Conference

Organised by:



Official Publication:



## REGISTRATION FORM

PLEASE USE BLOCK LETTERS - PHOTOCOPY FOR MULTIPLE REGISTRATIONS

Mr/Mrs/Ms..... (First name - in full) (Surname)

Position .....

Organisation .....

Main line of business .....

Address .....

..... Postcode .....

Phone .....

Fax .....

Mail completed registration form together with payment to: **AIC Conferences**  
G.P.O. Box 3924, Sydney NSW 2001 Ph: (02) 235 1700 Fax: (02) 223 8216  
S403 AUSTCOM 3/93

CALL NOW TO RESERVE YOUR PLACE ON (02) 235 1700

# The Resale Revolution

The liberal reforms embodied in the *Telecommunications Act, 1991*, have spurred the development of resale in Australia. Mark McDonnell examines the burgeoning industry and its players.

Welcome to the world of call discounting — a bargain hunter's bonanza awaits! In the wake of resale liberalisation, telecoms users now enjoy an unprecedented choice in service offerings for long distance and international carriage of their voice, data and facsimile traffic. While only the licensed carriers (Telecom/OTC and Optus) can own and operate public telecommunications networks, others, generally known as service providers, can offer services and thereby compete with the carriers. In the words of the *Telecommunications Act, 1991*, these non-carrier provided services are 'eligible services' and they can only be offered under conditions detailed in two class licences issued by Austel: A Service Providers Class Licence and an International Service Providers Class Licence.

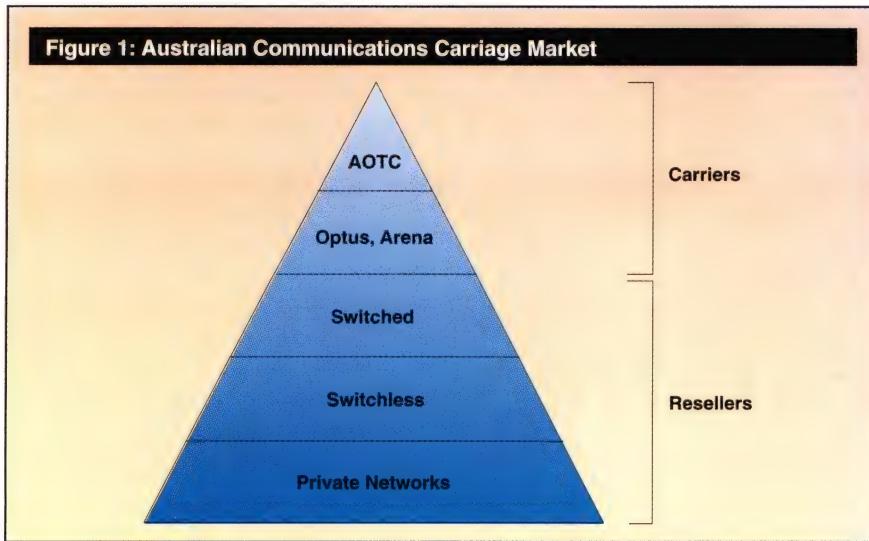
The term 'service provider' is broader than 'reseller' and encompasses value added networks and services. From a legislative viewpoint, there is no significant difference between value added networks (VANs), value added services (VAS) and resellers — all are service providers. Indeed, the 1991 legislation expunged the references to 'value added services' that formed such an important part of the 1989 Act. The change makes good sense. After all, value added service providers are resellers, since they all make use of carrier networks and facilities as part of a total, repackaged service. Equally, resellers could reasonably be classed as 'value added' where they offer something other than or additional to a carrier's service. This is an area where much can depend on semantics and outlook.

From a market perspective, however, the differences between VAS and resale are still fairly clear, relating to the kinds of services supplied. So in this article we won't be looking at the companies best known as value added networks, such as GE Information Services, EDS, Paxus or Telecom Plus. Instead, the emphasis is squarely on companies offering standard voice and data services based on leased circuits and virtual private networks. But note two caveats: In some cases a sharp distinction between VAS and resale cannot be made, particularly in the data communication market where companies offer both transmission and carriage services as well as higher level software products; and secondly, this article does not purport to profile all resellers active in the Australian market — just most of them. In neither case is any bias intended.

The impact of resale on the structure of the communications industry is represented in Figure 1 on page 90. AOTC is at the apex of the supplier pyramid as the dominant carrier in the market. Next are the newly licensed carriers: Optus and Arena. Then come the resellers, who can be divided into two main groups: Switched and switchless. The difference between these two groups is explained



below and both types are operating in the Australian marketplace. At the base of the pyramid are the corporate and government communications networks, that are now permitted to carry third party traffic, becoming resellers of spare capacity. For private networks, resale is generally a low priority issue since most emphasis is on designing and dimensioning a network for internal use. In contrast, the companies featured in this review are all concentrating on the sale of services to others.



## Netex

Network Exchange Pty Ltd, better known as Netex, was launched in 1992 by Alan Sangster, a telecommunications consultant, and two associates, Ray Burns and Mick Glover, who both had extensive network engineering experience with Telecom. Netex is based in Bondi Junction, in Sydney's eastern suburbs, and has representative offices in Brisbane, Gosford, Canberra, Melbourne and Perth. The company provides a good example of resale entrepreneurship, demonstrating that marketing opportunities exist for small, highly focused organisations, where the most significant form of investment capital is the knowledge and expertise of the core team members.

In US parlance, Netex is a 'switchless reseller.' It does not invest in separate switching systems, acquire leased circuits or establish any independent network facilities. Instead, Netex is basically a marketing operation, selling the technology of a major carrier; in this case, Telecom's CustomNet Horizon and OTC's Call Plan. In common with many US switchless resellers, who offer services such as AT&T's Software Defined Network (SDN), Netex has built its business opportunity on the successful marketing of virtual private networks (VPN).

CustomNet Horizon is a VPN service targeted at multi-location customers particularly high volume users.

The basic principle of switchless resale is very simple: Purchase a multi-location service from a major carrier and then sign up a number of users to share it. Typically, the reseller's customers are not quite large enough to join the carrier's scheme directly, but the savings can be captured where several smaller customers operate collectively via a reseller, which aggregates their traffic. In this way, the reseller can be very effective in breaking down the customer segmentation practices of the major carriers, extending bulk discounts to groups other than the large corporate customer.

Netex is concentrating on companies with an annual Australia-wide telecommunications service bill in the range of \$100,000 to about \$1 million.

In the US, switchless resellers are often classified into two groups: 'Aggregators' and 'rebillers.' An aggregator does not have a separate billing system, and its customers are billed directly by the carrier and the aggregator sends a separate bill to each site to claim a share of the customer savings. In contrast, 'rebillers' get a master bill from the carrier and then send out their own bills and do their own customer service.

Netex is a rebiller. It is singly responsible to Telecom and OTC for all charges incurred by its customers and carries the risk of its customers defaulting on payment. This exposure illustrates an important commercial difference between the two categories of switchless resale. Netex also has formal responsibility for ongoing maintenance and customer service, but in practice subcontracts all maintenance to Telecom. In this way, it is able to keep its staff costs and other overheads fairly low, and operate as a very lean competitor. Since its business is basically arbitrage, low overheads are critical.

For the customer, the main benefit Netex offers is the savings on long distance and international charges that are possible. For international calls, the discount rate is 15% compared with IDD, whereas the extent of saving on STD calls varies from case to case depending on traffic patterns. CustomNet Horizon distinguishes between 'on-net' calls, 'hop-off' calls and 'off-net' calls, each of which is charged differently. Data traffic is also more expensive than voice. But to illustrate a hypothetical case, the table on page 91 shows potential savings for a multi-location customer currently spending \$100,000 p.a. on 'eligible' STD calls (that is, on-net and hop-off). The annual net savings are around 20% in the 'early' case and about 40% in the 'maximum' case.

The 'maximum' rate reflects prospective growth in total traffic, where all Netex cus-

tomers share in a higher discount level. According to Alan Sangster, the 20% net saving figure applies in the early stages of Netex operations, where total turnover from all customers is less than \$10 million annually. The higher or 'maximum' savings relate to an expanded customer base generating aggregate revenues over \$20 million a year.

In short, Telecom's CustomNet Horizon discount structure provides incentives for rapid growth in resale operations, as each successive Netex customer can help extend the level of discounts available to the group as a whole.

## IDT

Another company making extensive use of existing carrier services to offer a discount call scheme is International Discount Telecommunications (IDT). IDT is based in New York and offers international telephone calls to its customers by taking advantage of lower rates in the US. IDT offers a number of reverse calling schemes; the 'super budget service' is available from Australia and involves a four step call set-up procedure:

1. The Australian client calls IDT's United States switch on a special access number;
2. The caller hangs up after one ring;
3. Within a minute, the switch automatically calls back, and the Australian client then enters a security code;
4. Dial tone is established so that third party calls can now be placed.

The service allows calls to be made to the US or any other international destination using IDT as a transit switching centre. IDT's President, Howard Jonas, told *Australian Communications* that Australia's standard IDD rates were low compared with most countries, making it harder for his company to offer the discounts available to customers in other parts of the world. Nonetheless, he claims savings up to 25% are possible using his service. IDT is currently offering a bonus as an incentive to prospective Australian clients: \$US50,000 worth of international calls free to new clients three months after joining the scheme; and another \$US50,000 in free calls after a further nine months.

Yes, Virginia there is a Santa Claus; or maybe it's just that competition is starting to get serious!

IDT operates its own switch although most of the traffic handled by IDT is routed via carrier networks including, most obviously, the PSTN. In Australia, the switched resellers are more prevalent than their switchless cousins, the rebillers or aggregators. A switched reseller is simply a company that installs independent switching centres in strategic locations, linked by carrier-supplied leased lines so that, broadly speaking, only the transmission element of the carrier network is resold. This reduces the reseller's dependency on carrier provided facilities but also increases the costs for market entry since there is now a separate infrastructure to install, operate and maintain.

## AAP Telecommunications

One of the largest and best known switched resellers in Australia is AAP Telecommunications (AAPT), a joint venture company 51% owned by AAP Information Services, with the Todd Corporation of New Zealand and MCI Communications each owning 24.5%. MCI's participation has been significant in bringing the experience of a US carrier to the company, with some striking similarities in the equipment and services in use. For example, AAPT has followed MCI in selecting DSC as its major switch supplier. Furthermore, MCI's Vnet service has provided a core feature set in the development of some AAPT services. These comparisons are hardly surprising, particularly as AAPT's Chief Operating Officer, Larry Williams, is a former senior executive of MCI.

AAPT has established switches in: Gold Coast, Brisbane, Canberra, Adelaide, Perth, Melbourne and Sydney. Telecom 2Mbps Megalinks provide the main transmission service, although AAPT is seeking higher bandwidth trunk links (up to 8Mbps). The company has also used satellite services for connections and microwave and ISDN for local customer access. CEO, Barry Wheeler, has put on record AAPT's interest in using both Telecom and Optus services.

Telecom has already filed with Austel its National Connect Service, being used by AAPT. Telecom's description of the service is as a 'national access and egress service for Service Providers who provide call management services to third parties having large volumes of long distance telephony telecommunications.' Access is only available to callers on exchanges with calling line identification capability within nominated local call areas. Access is achieved where users dial 14xx as a prefix; in AAPT's case, the access code is '1414.' AAPT also plans to make some use of CustomNet Horizon for customers using its 'First Choice' service.

In short, AAPT's strategy is to utilise a range of carrier services to create distinct products aiming at all segments of the business market. Wheeler concedes that with '1414' access, the residential user may have access to AAPT in the future, but coverage of private homes is not a priority for the company in the immediate future.

Wheeler says AAPT competes with both carriers and resellers on the basis of price, service and billing.

Looking at pricing first, AAPT's Vista is a long distance and international telephone service that costs 38.5 cents for a one minute call from Sydney to Melbourne in business hours. This compares with a standard STD rate of 47 cents per minute, using Telecom. An international call to, say, Singapore or the US costs \$1.34 per minute, again using peak times. This compares with OTC's standard rates to these countries of \$1.49 per minute.

There are some additional discounts on offer, including 'customer savings plans'

### Saving Through Resale

|  | Early    | Maximum  |
|--|----------|----------|
| For a \$100,000 p.a. STD bill and anticipated discount of:   | 45%      | 70%      |
| <i>Saving</i>  | \$45,000 | \$70,000 |
| <b>Less:</b>   |          |          |
| Network Exchange Fee (20% of Discount)   | \$9,000  | \$14,000 |
| Say 50% of calls to non-members in major cities<br>@ 25 cents/call (assuming 3 minute call duration) | \$11,000 | \$11,000 |
| Annual Telecom line conversion maintenance charges<br>for (say) 10 lines @ \$156                     | \$1,560  | \$1,560  |
| (Say) Bank Guarantee for \$20,000 at say 1%  | \$200    | \$200    |
| <i>Net Annual Saving</i>   | \$23,240 | \$43,240 |
| <i>Approximate Saving</i>  | 20%      | 40%      |

where extra savings are provided to customers who sign a two year agreement. First Choice customers can achieve even greater savings. Of course, Telecom, OTC and Optus are all responding to increased price competition with their own special deals and discount arrangements including flexiplans, extended off-peak hours, holiday specials and even permanent reductions on selected routes. Ascertaining who has the best deal, whether on an ad hoc basis or in the development of least cost routing systems, is becoming an increasingly complex exercise.

Resellers are thus helping to generate a whole new industry in the supply of least cost routing systems and comparative price studies. So suffice it to say that AAPT is price competitive but direct comparisons can be misleading since, like the carriers, there are different charges for services that may seem very much alike.

In relation to service, AAPT has local representation in all States, uses account managers to give personal attention to large customers, and maintains a 24 hour customer service line and help desk among other things.

But it is probably in relation to its billing system that AAPT is most clearly setting itself apart from other service providers. Again, the billing software package comes from MCI and its key attributes are its scope and flexibility, allowing customers to choose their own billing cycle and reporting features. A sample graph appears on page 95 and is only one of several graphs that are standard inclusions in the AAPT bill; in this case, showing the top 10 call destinations for a particular month. AAPT's approach is to include in the customer's bill key data from a detailed traffic analysis that essentially amounts to a monthly management report. Other information provided includes the daily traffic profile, monthly traffic profile by hour of the day, frequently called numbers, call details and for multi-site customers, location charges and usage summaries.

AAP's participation in the third mobile licensee, Arena-GSM, points to the possible migration from switched resale to common carriage, particularly after 1997 when cur-

rent policy allows further liberalisation. Wheeler considers that AAPT's supply of long distance and international service, and Arena's entry into cellular telephony is highly complementary, opening opportunities for joint marketing and trunk distribution of cellular calls over AAPT's network.

Mobile and long distance service is a potent mix, and one that takes AAPT into a much more directly competitive relationship with the carriers. It also invites yet another comparison with US developments, where AT&T and McCaw have entered into a similar arrangement enabling the long distance carrier to bypass local exchanges and encourage wireless access to its network.

### PacRim

While AAPT is looking to serve business customers across all industries some other resellers have a more specialised customer set. Pacrim Financial Network is one of four companies in the Trade Wind group that collectively provides communications equipment and services to the finance sector. All companies in the group are Australian-owned and clients include banks, brokers, emergency services and large corporations.

Pacrim is the newest of the four companies, having been established two years ago to provide wide area voice and data services to the financial markets. True to its name, the Pacrim network links the major financial centres of east Asia and Australasia: Tokyo, Hong Kong, Singapore, Sydney, Melbourne, Auckland and Wellington, with its Sydney hub also providing connections to London and New York.

The network nodes are based on fully redundant Timeplex Link 2 bandwidth managers with a very high level of system availability. The OTC gateway for Pacrim's international network is connected to the Sydney and Melbourne nodes by Megalinks.

Stage 2 of network development, to begin this year, provides for a mesh network with leased circuits connecting major offshore sites; for example, Hong Kong to London, London to New York, Tokyo to both London and New York. The current international transmission links comprise 64Kbps

and 128Kbps digital services with Switched Digital (OTC's 64Kbps on demand service) as backup. Consideration is being given to expanding the network's Asian operations to Kuala Lumpur and other ASEAN centres.

Within Australia, the company has no immediate plans to expand to other capitals. General Manager, David James, points out that the Sydney-Melbourne axis gives PacRim direct access to about 85% of the Australian corporate market and the vast majority of the finance sector.

The network has been in commercial operation for about a year and has approximately 25 customers, including three of the top five Australian banks. Two thirds of its customers are Australian-based and its marketing success is to some extent due to the good reputation of the Trade Wind companies as market leaders in the provision of dealing room communications systems.

This sister relationship with companies providing specialised customer equipment to its target market has clearly assisted PacRim in adopting an end-to-end network management philosophy. As a reseller servicing the finance industry, PacRim sees this as one aspect of enhancing total network reliability and quality. PacRim customers obtain a contractually guaranteed minimum service availability level (99.5%) with rebates for non-performance. There is a single point of contact for each customer and 24 hour a day end-to-end network support and maintenance including coordinated fault reporting. PacRim handles all aspects of service commissioning, including last mile or local loop connections, and its contracts provide sufficient flexibility to allow customers to relocate services without penalty. There is also attention to billing, covering all network services with complete itemisation.

PacRim has entered into a number of business relationships to meet its service commitments. In Australia and Singapore, the company's own staff are used, in London and New York a facilities management company is engaged as PacRim's agent, while in New Zealand and Hong Kong operational support is supplied by local carriers and their subsidiaries. In Australia, David James emphasises his company's close links with OTC, which he describes as a 'strategic alliance' and PacRim's 'major business relationship.' This includes a financing agreement with OTC's subsidiary, Navigator, for billing and a network lease back agreement.

PacRim aims to be 25% cheaper than OTC on standard services. While offering a 64Kbps voice service, there is active marketing of voice compression at 32, 16 and 8-Kbps. A wide range of data services is also available including X.25, synchronous and asynchronous connection, primarily concentrating on data rates up to 128Kbps. The company has also recently launched Flexifax, a document distribution service that is directly competitive with Telecom's Fax-stream and OTC's Easifax services. Typical

prices include a 16Kbps link from Sydney to Melbourne costing about \$9,000 p.a. and a 9.6Kbps service from Sydney to London (end-to-end) costs \$4,350 per month.

## SITA

Like PacRim, SITA (the Societe Internationale de Telecommunications Aeronautiques) operates its own international network, but one that is far more extensive, with services to almost 200 countries, and local support in over 100. In existence for 43 years, SITA owns and operates the world's largest private international data communications network. SITA is a non-profit cooperative owned by about 450 companies, chiefly drawn from the civil aviation and transport industries.

The cooperative is a supporter of network liberalisation which it considers will provide new business opportunities, and has promoted the revised CCITT D.I recommendation on the general conditions and principles for international private leased circuits, that allows sub-lease and resale.

In the last three years SITA has consolidated and expanded its Australian presence. Its main hub is in Sydney, with leased circuit connections to major capitals and other large centres. The network comprises a series of layered, integrated networks, particularly the Data Transport Network and the Mega Transport Network (MTN). The MTN is fully interconnected with the X.25-based Xpercom network, which SITA has operated since 1989. PADs have been installed at most X.25 sites, allowing X.28 asynchronous access on a direct or dial-up basis. There is a strong emphasis on service availability and response time. Published data for 1991 states that the Data Transport Network availability that year was consistently at or above 99.96%, reaching 99.99% in three months. Network response time has been maintained below the set target of 2.1 seconds.

SITA's core business is the supply of airline communications services. All airlines operating in Australia use SITA, along with over 400 other airlines. In addition to an extensive fixed network, SITA operates several communications systems for inflight contact: VHF AIRCOM, a data link between aircraft and ground computers; satellite AIRCOM for global voice and data communications and Aeronautical Mobile Terrestrial Telephone services (AMTT) using direct air to ground links with PSTN interconnection.

The SITA network carries many applications, some of which support large transaction volumes. The airline computer reservation systems, for example, are constantly in use. The US-based SABRE system alone peaked at 2,400 transactions per second on a worldwide basis during recent periods of intense competition with fare discounting. There are various store and forward messaging services supported with file transfer, broadcast messaging, facsimile and X.400 based services including electronic mail and EDI, using both ANSI X.12 and EDIFACT

standards. Database services include air fares; passenger, charter and cargo flights operated by over 700 airlines; and travel information. Other application packages include credit card authorisation, flight planning and weather forecasting. Growth in network traffic in recent years has been compounding at between 20 to 30% annually.

Peter Barnes, a marketing consultant for SITA, is actively engaged in resale of the network's capabilities, with a special focus on the transport related sector. According to Barnes, SITA has attracted business from companies in freight forwarding (such as DHL, AEI, TNT), aerospace (e.g. Boeing and Rolls Royce), travel (Jetset, American Express, Reed International), airports and hotels (Hilton International, Radisson).

SITA has created a subsidiary, Scitor to attract communications users outside the airline and transport industries to its network. Some attention is also now being given to the banking and finance sector.

The network is primarily established for data communications on both a host-to-host and terminal-to-host basis, with provision for telex and fax traffic. SITA has introduced some voice services between Europe and the US and between Australia and New Zealand for internal use, using 8Kbps voice compression. Australian customers will have access to voice connection this year locally and to NZ and the US.

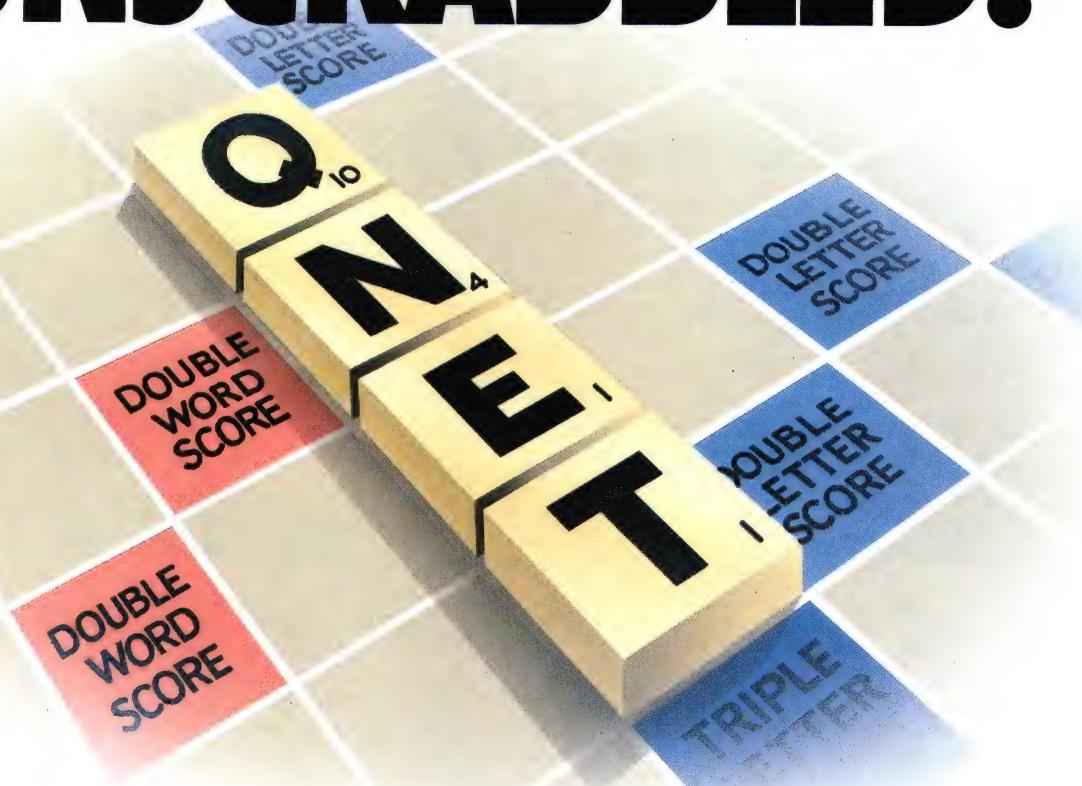
Cost savings compared with dedicated private networks are described as 'marginal' for point-to-point services, but the global reach of the SITA network is clearly a major asset, and according to Peter Barnes, customers with multipoint requirements will see much bigger savings. Equally, with a staff of 3,500 located in offices all over the world, customer service is generally a matter of making a local call to the nearest service centre where staff speak the language of the country concerned. Few carriers can boast that kind of human resource deployment.

## BT/Syncordia

Nonetheless, there are carriers seeking to establish end-to-end international service and network management in their own right. As one of the largest carriers in the world, BT has an explicit global expansion program. The British carrier has been offering value added services internationally for several years, based on its Tymnet network, with about 5,000 nodes worldwide. BT's Global Network Service (GNS) provides access in over 100 countries, with the initial Australian nodes located in Brisbane, Sydney and Melbourne and other sites now operating in Perth, Adelaide and Canberra.

BT's emphasis is on 'one stop shopping' for information, ordering and trouble shooting as well as providing end-to-end support, network management and control, universal log-on, choice of centralised or decentralised billing and an option of billing in different currencies. GNS is currently being expanded

# BUSINESS COMMUNICATION UNSCRABBLED.



## THE FIRST WORD IN DIGITAL VOICE AND DATA TRANSMISSION IS Q-NET.

**M**ore and more companies are recognising the need for an expert service provider like Q-NET who can help them overcome the puzzling aspects of the wide range of carrier services, hardware choices and the increasing diversity of communications options required to develop and maintain a competitive advantage.

**W**e've earned our enviable reputation by providing creative yet simple communications solutions at significantly reduced cost.

**T**he secret lies in the innovative technology which forms the basis of our network.

This fact, supported by a high level of maintenance and design expertise, unscrabbles what could appear to be insurmountable connectivity problems.

**W**e provide high, medium and low speed data services, compressed digital voice tie-lines, private television conferencing and the resources you need to build and support the information network throughout your whole organisation.

**Q-NET**  
A U S T R A L I A

**BRISBANE (07) 852 1414**

**SYDNEY (02) 267 4884**

Call us today STD free on 008 773 201  
and put our claims to the test. You'll find  
we're more than as good as our word.

**OR TOLL FREE 008 773 201**

# Surveys show we have the world's best internetworking products.

## They also show you've never heard of them.

### Reliability



In a recent Buyers' Scorecard Survey by Computerworld magazine, network managers rated leading bridge/routers. 3Com's NETBuilder® was rated Most Reliable, ahead of the market leader.

### Performance



The Computerworld survey also rated NETBuilder highest for Performance. In another recent study — this one by Harvard University — NETBuilder II was 60.1% faster than the nearest competitor for FDDI routing.

### Responsiveness of vendor service



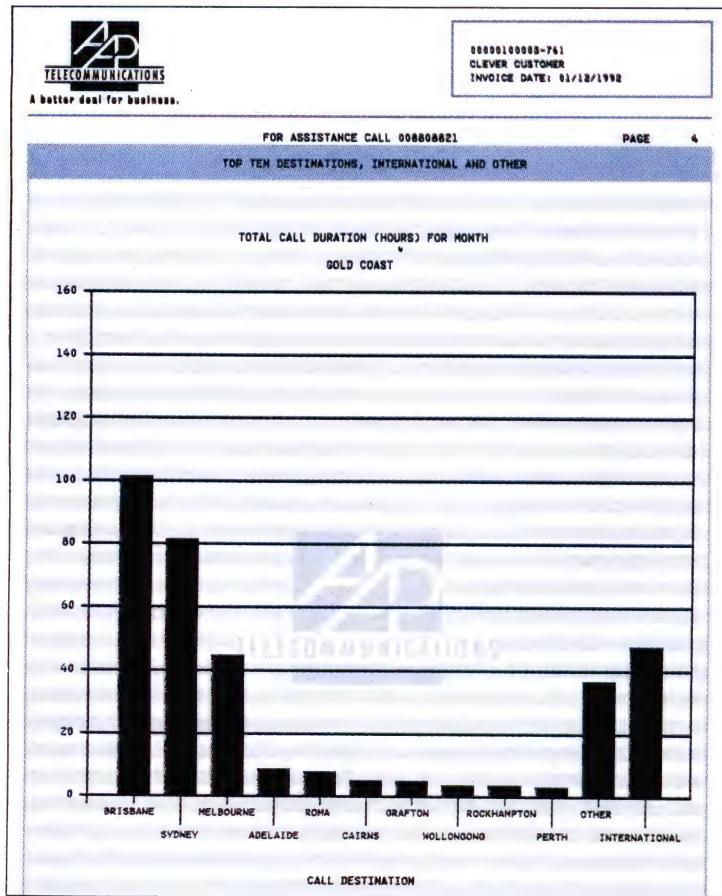
In fact, NETBuilder got the highest ratings in 11 of 14 categories. That included Value, Physical Design, and Responsiveness and Quality of Vendor Service and Support.

Most network managers know 3Com for adapters only. That's too bad, because both experts and users say our NETBuilder family of bridge/routers is the best in the business.

Computerworld asked 20 NETBuilder users if they would buy the product again, and 20 out of 20 said yes — an unprecedented customer loyalty of 100%. It's no wonder that last year *Systems Integration* magazine rated NETBuilder one of its "Products of the Year."

3Com internetworking products can make life better on your Ethernet, FDDI or Token Ring network. Just call (02) 959-3020, ext. 22 for more information.





Resellers compete on more than price alone: A sample graph from AAPT's billing system

to provide global frame relay capability in addition to its standard services such as EDI, X.400 messaging, funds transfer etc.

Yet GNS is only part of BT's broader global strategy. The creation of Syncordia two years ago was more than simply a means for providing outsourcing services to the world's largest companies. BT's own conception of Syncordia is as 'the first organisation to have established an international voice and data network with end-to-end integrated systems management and customer service.' The Syncordia network is now being used to offer Managed Links, an international private leased circuit service.

The Managed Links network has three main components; one links the Syncordia nodes in the two countries, the other two link the local nodes to customer premises. BT supplies and maintains a multiplexer at both ends of a managed link. This acts as a network terminating device for the circuit, allowing BT to manage and guarantee connection end-to-end. The service is available in bandwidths from 56/64Kbps to 384Kbps.

Essentially, the Syncordia link consists of bandwidth acquired from other carriers that is resold as part of a larger, managed network. This is identical with the standard practice of SITA and other switched resellers. It represents an important change in the conventional international carriage business, since BT takes full responsibility for end-to-end management of the service rather

than operating on a half circuit basis, where total network management is achieved on a cooperative basis with other carriers.

Significantly, Managed Links is marketed in a way that clearly identifies many of the limitations of a conventional carrier-provided leased circuit service, by offering a VPN package that has:

1. High levels of availability based on virtual connectivity with redundancy on the international links;
2. Service level guarantees as a standard feature of customer contracts;
3. A single point of contact for all ordering, billing and service; and
4. Automatic fault reporting.

BT's response to the competitive threat posed by resale could almost be characterised as a case of 'If you can't beat them join them.' OTC and other international carriers are also seeking to redress the limitations of their conventional leased circuit services with matching terms and conditions on guaranteed availability, one stop shopping, flexible billing and the like. But the distinctive feature of BT's approach is to 'go it alone' by setting up its own international network, with a local presence in many of the markets it serves.

Hence, we have BT Australasia (BTA) operating from its base in Sydney since 1987. This local presence has assisted BT in winning the contract to design, implement and manage a private network for the NSW Government, to be implemented by BTA.

The contract is itself further evidence of BT's active involvement in telecommunications resale. Initially, the State network will utilise Telecom's CustomNet but the intention is to establish a separate network with reserved line links sourced from the carrier.

BTA has also acknowledged the distinct possibility of 'third party resale' through the carriage of non-government traffic on the network. A BTA spokesman has confirmed that a final decision on carriage of non-government telecoms will be taken after consultation with the State Government.

## Saturn Global Network

More recently, a leading worldwide foreign exchange broker, M.W. Marshall and Company, which is 29.5% owned by BT, has entered the international service provider market through its subsidiary, the Saturn Global Network (SGN).

Headquartered in Sydney, SGN provides network connections from Australia to New Zealand, Singapore, Hong Kong, Tokyo, New York, Canada, London, Paris, Zurich, Frankfurt and Bahrain. Expansion to Taiwan, Malaysia and Korea is under consideration.

Essentially SGN operates the Marshall network, but is actively marketing additional network capacity to other users, such as Astley and Pearce, who will share the 256-Kbps link between Sydney and New York.

SGN provides customers with network management equipment as part of its service, enabling the customer to reconfigure bandwidth dynamically for voice and data uses. Like other resellers, voice compression at 8 to 32Kbps is provided to help ensure that all bandwidth may be used economically. Frame relay has also been implemented.

SGN has also fostered close relationships with the carriers, seeking leverage from its position as a major customer. It relies on various international carriers such as KDD, HKTI and TRT to house its equipment on their premises, using their international gateways as Saturn nodes. Within Australia it has built up a carefully balanced relationship with Optus and AOTC, using Megalinks to triangulate its head office, OTC's Broadway facilities and the Optus site at the Qantas International Centre in Sydney.

SGN has also contracted with Optus for a turnkey package which includes fractional multi-megabit capacity and use of major earth station sites in the mainland capitals.

## Q-Net

A similar approach has been taken by Q-Net Australia. Originally based on satellite networking, as one of the first customers to utilise the Aussat system in the mid-1980s, today Q-Net operates a hybrid satellite and terrestrial network to provide a range of voice and data services. The company uses terrestrial trunks between Brisbane, Sydney, Melbourne, Adelaide and Perth with major circuit, packet and frame relay switching nodes in Brisbane, Sydney and Melbourne.

The Brisbane-based communications company has attracted many of its customers from Queensland and has extended its trunk terrestrial network to major coastal towns northward to Cairns. The terrestrial trunks are a composite of ISDN, Megalinks and other digital leases. Q-Net also uses VSAT and SCPC technology to provide connections to smaller sites including inland towns, so that its network reach within Australia is more extensive than most other resellers.

Like SGN, Q-Net is able to utilise resources from its parent companies, Consolidated Press Holdings and Nine Network Australia, and in the process extend the network and services operated for the parent corporation to third parties. It is a familiar pattern in global IT and VAN markets, as evidenced by the success of companies such as the IBM Information Network, EDS and McDonnell Douglas Information Systems.

Customer benefits relate to both price and service. Q-Net customers have access to a 24 hour maintenance service via a freecall (008) number. The company's engineering staff are also available to provide free technical consultancy on service integration, carriage and network design.

On price, Q-Net aims to undercut carrier rates by 25% to 30% on recurrent expenditures, depending on location. Savings in the

first year are lower, due to service installation charges. The cost of circuits from the Q-Net node to the customer premises can also be a critical factor in the final cost, where the reseller is usually limited to distance sensitive carrier offerings.

### Conclusion

It is only 18 months since Austel issued its first Service Providers Class Licence, but since then there has been a quiet revolution in the marketing of telecommunications services within Australia. The eight companies surveyed here illustrate both the diversity and depth of a resale market that has flourished under the liberal reforms of 1991.

There is plenty of variety. Some resellers have made large investments in switching systems and support facilities; others have spent little or nothing on a separate infrastructure. Some are cultivating a strong relationship with one carrier; others are taking a more independent approach. Some are addressing the business market broadly; others are targeting particular industries. Some are concentrating on voice services; some on data; some handle both. All are active in the long distance and international markets, but while some are primarily developing a global or regional presence, others aim to offer widespread national coverage and local access.

Resellers now sell most of the standard voice, data and fax services available from the carriers; in some cases with additional features and benefits. They are highly competitive, typically offering savings of 20-25% compared with standard carrier offerings; sometimes more. Resellers have themselves made use of a wide range of carrier services, concentrating mainly on digital leased circuits and virtual private network services. Reseller demand has directly shaped new carrier services and is influencing network roll-out plans.

Resellers have also demonstrated a marked willingness to adopt new and innovative technologies, like frame relay and voice compression. Finally, they are looking to compete with carriers and each other on non-price factors, such as customer service, quality and enhanced billing systems.

The carriers have clearly responded to these pressures by introducing lower priced services and by becoming more quality conscious, upgrading service availability levels, technical support and account management practices. The revolution may not be over yet, but so far it looks like a success.

*Mark McDonnell is the principal of McDonnell Communications Research and is based in Wilberforce (NSW).*



## The communications revolution holds the key to the future of information technology

**Australian Communications** is the magazine dedicated to the coverage of the rapidly growing data and telecommunications industries . . . **Subscribe to Australian Communications and save 15% off the newsstand price.**

22 issues, two years, for \$96 (save 20%)  
 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AUS\$ .....

Bill my company Authorising signature .....

Charge my:  Amex  Diner's  Visa  Bankcard  Mastercard

Expires .....

No .....

Name .....

Company .....

Address .....

Postcode .....

Signature .....

**Post to: Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000**

**OR: Fax your application to us on (02) 264 2244**

**SUBSCRIBE NOW**



# Benchmarking — Finding Opportunities

**Brian White**

In the previous two *Management* columns, I have discussed the importance of communications benchmarking and the six steps of the benchmarking procedure, which can be summarised as:

1. *Identifying the key issues* by documenting and prioritising all processes and procedures within the communications support function and identifying the organisation's goals;
2. *Establish existing performance* by quantifying all aspects of the communications function;
3. *Gather external data*, ideally, by forming benchmarking partnerships with similar organisations;
4. *Analyse and compare data*, in particular, by querying differences between your parameters and those of other organisations;
5. *Formulate the change process*, ideally, with the close involvement of staff; and
6. *Implement change and continue to measure performance*.

This month I will focus on Steps 1 and 4, that is, 'What do you measure?' and 'What do the measurements mean?'

**Table 1: Benchmarking Parameters**

| Example Parameters            | Example Sub-Parameters  | Possible Source                       |
|-------------------------------|---|---------------------------------------|
| Carrier Costs                 | Voice call costs<br>Exchange line rentals<br>Dedicated data lines   | Cost control documentation            |
| Maintenance Costs             | Data equipment \$p.a.<br>PABX \$p.a.                                | Cost control documentation            |
| Number of Support Staff       | Planning staff<br>Technical support<br>Admin/cost control/reporting | Comms Group HR Planning documentation |
| Value of Infrastructure       | Voice network<br>Data network                                       | Asset register                        |
| WAN Availability              | Average % uptime per node<br>Average % uptime per link              | Network service level reporting       |
| End User Service Availability | Minutes lost/mth/phone<br>Minutes lost/mth/data connection          | User service level reporting          |
| Network Capacity/ Bandwidth   | Average WAN data bandwidth/user                                     | Network documentation                 |
| User Satisfaction             | % Dissatisfied<br>% Satisfied<br>% Very satisfied                   | Regular user surveys                  |
| Average Restoration Time      | Minutes to restore failed telephone service                         | User service level reporting          |
| Number of Users               | Telephone users<br>PC/LAN users<br>Data Terminal users              | Comms Group documentation             |

## What Do You Measure?

In Step 1 we identify key issues (e.g. restructuring, quality programs, strategic initiatives), then put together a brief overview document of the communications support function, including:

- Organisational business drivers;
- The organisation's strategic advantages;
- Communications Group staff structure;
- A list of communications services provided;
- Processes (i.e. a 'roadmap' of comms service delivery);
- Communications investment and costs;
- Critical success factors for the Communications Group;
- Communications technologies used;
- Performance and fault levels; and
- User issues.

Then we ask questions. This is important because the direction you take in the benchmarking process will largely be determined by these questions. For example:

- What issues cause the most user problems?
- What contributes most to user satisfaction?
- In which areas are most costs incurred?
- Where is the greatest organisational change being felt?
- What processes in the Communications Group are the most inefficient?
- Which communications issues are not being fully addressed currently?

After you honestly answer these questions, you can formulate a list of parameters to quantify. Among the many dozens of base parameters some of the more obvious ones are included in Table 1. Many of these base parameters are not easily comparable in their raw form with other organisations, so the numbers are normalised into ratios such as:

- Telephone Costs:Total Employees
- Communications Group Staff:Total Employees
- Carrier Costs:Total Employees

## Performance Gaps

Only if you identify a large positive gap in a particular area are you able to leave it and examine other areas. A small positive gap still means that you need to make sure it stays positive or is increased. A small negative gap is not serious, but a large negative gap requires a major change of procedures and processes.

We should start with the most important performance gap — user satisfaction, which is linked to:

- Cost effectiveness (i.e. value for money services);
- Quality (i.e. effectively meeting user needs);
- Productivity (i.e. efficient service delivery); and
- Timeliness (i.e. services delivered and repaired on time).

User satisfaction is often the most difficult gap to close because:

- It is caused by a combination of all other gaps; and
- Even if there were no other gaps, the user's perception (which is linked to satisfaction) may not reflect the actual effort of the Communications Group.

The second point is especially important, given the fact that most Communications Managers and staff do not spend as much time with users as they need to. This difficulty is made worse by the natural attraction of most communications professionals to technical challenges rather than relationships with users. The brief answer to this problem is a concerted effort to communicate with users and 'sell' the value of the Communications Group.

It should also be recognised that some gaps which may appear unfavourable could, on closer examination, have a valid reason. For example, a higher cost for queuing services (ACD, etc.) may reflect something unique to the organisation, such as a corporate policy of high service levels for customer enquiries. The higher customer satisfaction, goodwill and repeat business may more than compensate for the higher customer service cost.

### **Analysing Gaps**

In practice, there are a number of trade-offs which make it difficult to reduce all gaps simultaneously. For example, corners could be cut to reduce costs in the short term, but in the medium term, costs and service levels would suffer. So understanding the trade-offs, for example between costs and service levels, will avoid making things worse.

One of the keys to successful benchmarking is finding the real cause of a performance gap. Table 2 lists some of the contributing factors which cause unfavourable gaps. Finding the real cause requires experience and familiarity, but the following questions can assist:

- Who is involved in delivering the service?
- Why are they involved?
- What are they doing?
- Why are they doing it?
- Are they adding value?
- Should this service be provided internally or externally?
- What aspects of work cannot be changed?
- What does the user see as the final service?
- What are the essential tasks to deliver the service?
- Which tasks add little or no value?

This may mean looking at a process from end-to-end, such as the fault resolution procedure, the funding/expenditure process, the change management procedure, etc. Understanding the underlying causes requires the organisation to be seen as a network of related activities.

Step back and question each step in the process. Any activity which does not add value is obviously waste, but seeing a task as

**Table 2: Gaps in Benchmark Parameters**

| Parameter or Ratio | Example Causes for Unfavourable Gap  |
|--------------------|--|
| \$/telephone       | Network design<br>The mix of carrier services<br>PABX software configuration   |
| Asset Value        | Recent upgrade<br>Under capitalisation<br>Leasing, renting policies<br>Inaccurate documentation<br>Depreciation policies                                     |
| Support Staff      | Staff structure & responsibilities<br>The wrong mix of individuals<br>Lack of skills training  |
| EUS Performance    | Fault reporting/tracking procedures<br>Escalation procedures<br>Maintenance contract<br>Third party maintainer<br>Unreliable hardware<br>Unreliable services |
| User Satisfaction  | Lack of contact between the Communications Group and users<br>Poor service performance<br>Unreliable services  |

EUS = End User Service

wasted can be difficult because it may be hidden from view. For example, parts of the funding/expenditure process will be within the accounts department and parts of the fault resolution procedure will involve users or external contractors. In other words, focus on the processes and **why** they are done as well as **how**.

### **Conclusion**

Trying to determine what any large or small organisation does right or wrong is usually not easy. Benchmarking can reveal that the right things are being done the wrong way or the wrong things are being done well. Without benchmarking, you may not know what improvements are possible.

*Brian White is a Senior Consultant at AAS Pty Ltd (Sydney) where he specialises in strategic planning, network engineering, benchmarking and communications management.*

**In the April edition of**

# **AUSTRALIAN communications**

## **OPTUS — THE STORY SO FAR**

In a little over one year, new Australian telecommunications carrier Optus Communications has made remarkable progress in both defining its image and rolling out services to consumers. In next month's issue we take an in-depth look at the Optus Communications story to date.

## **LAN ANALYSERS**

LAN analyser vendors are happy to talk up flashy features and functions, but maybe they would be better off paying more attention to the basic capabilities of their products. Next month we examine LAN analysers and how they assist network engineers.

## **IMPLEMENTING IP**

What are the pros and cons of using Unix and DOS/Windows IP implementations from vendors like 3Com, Intercon and Sun in place of conventional network operating systems like NetWare and LAN Manager? Next month we explore an alternative networking reality.

## **ATUG'93 PREVIEW**

It's on once again — ATUG'93, this year's version of the fast-changing Australian communications industry's annual gabfest and equipment exhibition, will take place in Sydney in May. In our April edition we take a look at what visitors can expect to find.

Advertising Enquiries:

**Craig Burkhill**  
**(02) 264 2200**

# Considering FDDI?



## Test FDDI (And Everything Else!) With The DA-30 Analyzer.



FDDI doesn't exist in a vacuum—it is used in today's mixed topology networks. Don't invest in test equipment that can handle only part of your internetwork.

The DA-30 gives you the best FDDI analysis value and the modularity to add Token Ring, Ethernet, V.35, X.21, T1, RS-232, V.36/RS-449, SMDS and Frame Relay at 2 Mbps. Configure it to your network today and then expand it for the future.

For FDDI testing you'll be able to simultaneously transmit and receive traffic at the speeds this technology demands. The DA-30 collects information about network

events such as frame counts, utilization, frame size and ring mapping. In either dual attachment mode or single attachment mode, you'll be able to decode MAC, SMT, LLC and upper layers running over FDDI.

The unique DA-30 dual analyzer tests mission-critical interconnect devices like bridges and routers at loads ranging up to 446,525 fps.



Before finalizing your FDDI decision, learn about the analyzer that tests your entire internetwork by calling  
Melbourne: (03) 690 6700  
Sydney: (02) 437 5011

**Wandel & Goltermann Pty. Ltd.,**  
PO Box 419  
World Trade Centre, Victoria 3005

E1192D3/0104/C/AUS

**Wandel & Goltermann**  
Electronic Measurement Technology



**Stay on line in the world of office communications**



Mobile phones  Business Communications  Network systems  Office Equipment

**THE AUSTRALIAN INTERNATIONAL COMMUNICATIONS AND OFFICE TECHNOLOGY EXHIBITION**

**DARLING HARBOUR SYDNEY 9-12 MARCH 1993**

**TUES 11.00 am - 7.00 pm WED 10.00 am - 7.00 pm THURS *LATENIGHT* 10.00 am - 9.00 pm**

**FRI 10.00 am - 5.00 pm**

**CHILDREN UNDER 18 NOT ADMITTED. ADMISSION \$14**

**Staged in conjunction with PC93 - Australia's leading computer exhibition**



Australian Exhibition Services Pty Ltd 424 St Kilda Road Melbourne Vic 3004 Australia Tel + 61 3 867 4500 Free Call 008 335 010 Fax + 61 3 867 7981 Telex AA 39329

# Reinventing the Hub

**F**orget everything you've ever learned about LAN hubs. Plexcom's Quantumnet takes a totally different approach — no adaptor cards and no CPUs on the desktop. And when Plexcom ships a hard disk module later this year, users of this brand-new technology could have a LAN with data rates of up to 1.6Gbps.

In a nutshell, Plexcom has put a PC onto a card that fits into the Quantumserver hub. Each PC card, or 'CPU module,' features an Intel 386 or 486 processor and up to 8-Mbytes of RAM, and each can be shared by up to 10 users. The only equipment on the user's desk is a monitor and keyboard. The hub connects to conventional Ethernet or Token Ring LANs (and, after mid-1993, FDDI networks as well) via an interface module. When the hard disk module becomes available, the Quantumserver will become a full-fledged LAN, and users will be able to exchange data across the hub's 1.6-Gbps backplane. All products are distributed in Australia by allNET Technologies.

Plexcom isn't the first vendor to marry computer and hub capabilities. Texas-based Optical Data Systems (ODS) offers a PC-on-a-card module for its ODS 295 multiprotocol hub, and Ungermann-Bass offers Access/Open server and application processing modules for its Access/One Enterprise Hub. But Plexcom points out that these solutions put only the server — and not the entire network — into the hub.

Plexcom claims there are several advantages to moving the CPU inside the hub. First, it saves on the cost of desktop computers, not only because the Quantumnet CPU modules cost less than conventional workstations, but also because each CPU module can be shared by multiple users. Second, the CPU modules in the Quantumserver offer built-in LAN connectivity, so users save the cost of LAN adaptor cards. Finally, the Quantumserver chassis can be managed by any standard SNMP system.

The keyboards and monitors on users' desktops feature standard mouse and pen connectors. The desktop components plug into a Quantumlink transceiver that in turn connects to the hub; using a proprietary protocol, distances of over 100 metres are possible between desktop and hub (see figure).

Each transceiver offers connections for one user's monitor and keyboard, plus two serial ports and one parallel port. Printers and fax machines can also be plugged into the transceiver or hub. For users who aren't quite ready to give up possession of a desktop computer, Plexcom offers standalone enclosures that house the CPU module on the desktop. Two models of enclosures are available: One with space for a hard drive and one without. The enclosures plug directly into the transceiver.

All Quantumnet components are linked in a star configuration over standard shielded or unshielded twisted-pair, fibre optic, or coaxial cabling. For wireless connections, Plexcom also offers infra-red and radio frequency modules for the Quantumserver hub and matching ports on the transceivers; maximum wireless distances were not available from Plexcom.

All media connectors are available for directly connecting user keyboard/monitors to transceivers, or for linking multiple Quantumserver chassis. Inside the Quantumserver chassis, the vendor's Plexnet bridge and router modules can link the hub to remote sites using standard LAN connections. Plex-

**Product:** Quantumnet; Quantumserver hub with CPU modules

**Vendor:** allNET Technologies  
Unit 8, 3 Gibbs Street  
Chatswood NSW 2067  
Tel: (02) 417 4800  
Fax: (02) 417 2281

**Price:** Quantumserver chassis, \$1,520 to \$1,800. CPU modules, \$1,570 to \$2,780. I/O modules \$2,125 to \$4,095. Quantumlink transceivers, \$245 to \$975. Standalone enclosures, \$205.

com is also working on wide area connectivity options for the Quantumserver.

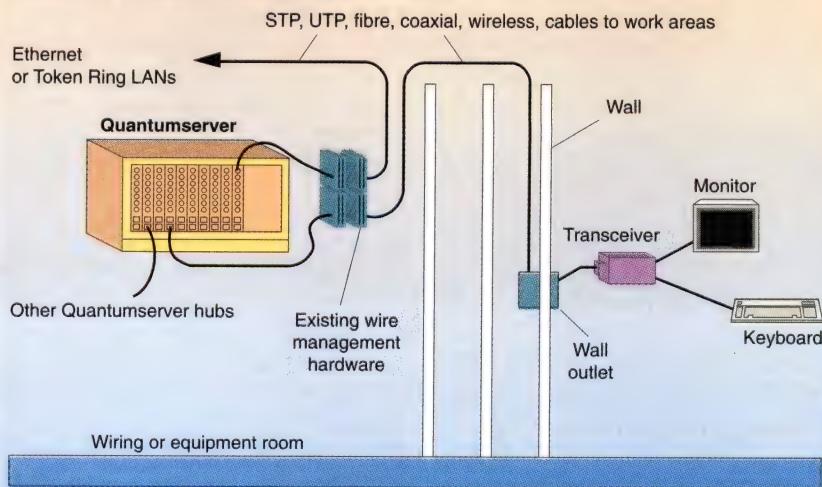
The vendor constructed its Quantumserver chassis around its existing Plexnet Intelligent Concentrator. Like its predecessor, the Quantumserver comes with four, 10, or 14 slots. However, the Quantumserver has new features too, including more than twice as much available bandwidth, thanks to a proprietary 1.6Gbps backplane.

The CPU modules interact over the high-speed backplane, which Plexcom says is constructed like a computer's bus. In addition, existing modules for the Plexnet hub can be used to link the Quantumserver to conventional LANs, minis and SNA environments. Among the available options are interface modules for Ethernet, Token Ring, 3270, AS/400, and AppleTalk connectivity, plus bridging, routing, and SNMP net management modules. Each CPU module in the Quantumserver chassis can either be dedicated to one user or shared by up to 10 users. Sharing a CPU module requires an I/O module that dynamically allocated CPU cycles to each user. Each I/O module is capable of handling up to 12 CPU modules.

**Mary Jander**

## Putting PCs into the Hub

The Quantumserver hub contains multiple CPU cards that connect to monitors and keyboards on user's desks via a transceiver. The hub, in turn, can connect to Ethernet or Token Ring LANs and to other Quantumservers.



## Why not get the WHOLE story on networking?

Whether it's FDDI, OSI, ATM, ISDN, SNA, Frame Relay, Fastpac, Token Ring or 10Base-T, you need to be on top of the rapid changes now taking place in the communications industry.

In the pages of Australian Communications, every month the region's top communications journalists, leading industry figures, academics, professionals and industry experts bring you the latest news and analysis on the technical, political and management issues facing this dynamic industry.

The time to subscribe is NOW! with savings up to 20% off the newsstand price.

### SUBSCRIBE NOW

22 issues, two years, for \$96 (save 20%)  
 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AUS\$.....

Bill my company Authorising signature.....

Charge my:  Amex  Diner's  Visa  Bankcard  Mastercard

No ..... Expires.....

Name .....

Company .....

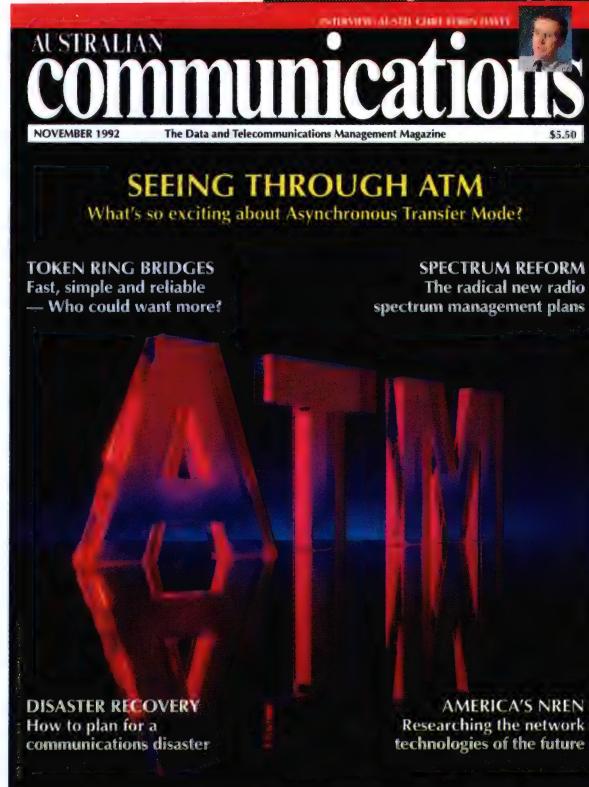
Address .....

Postcode .....

Signature .....

Post to: Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000

OR: Fax your application to us on (02) 264 2244





Banyan's VINES 5.50 incorporates Streettalk III

## VINES 5.50 Released

Stealing a march on Novell's upcoming NetWare 4.0, Banyan Systems has now released version 5.50 of its VINES network operating system.

Featuring Streettalk III, the third generation of Banyan's global directory service, the new VINES includes improved wide area network capabilities, workstation support for leading desktop operating environments — such as OS/2 and Windows — as well as backwards compatibility with all earlier VINES releases, company officials said.

Through its new Directory Integration Architecture, Streettalk III provides more effective communication with other applications and network directories and allows users to locate objects with an Advanced Object Query Model. Users can now view attributes about any object on the network, such as the address, service history and available fonts of a particular printer, or, with the Advanced Object Search, locate an object based on its attributes.

The new wide area network capabilities in version 5.50 include an ISDN server-to-server option and a source level routing feature which allows VINES IP packets to be routed over third party Token Ring bridges.

**Banyan (02) 954 3228**

with the new PathWise family of bridges and routers.

Consisting of the PathWise/7609 dual port Ethernet bridge and the PathWise/7622 dual port Token Ring bridge, the new product line provides LAN connections to both Ethernet and 4/16Mbps Token Ring networks, and WAN connections over E1, X.25 and frame relay networks. The new devices can also support multiprotocol routing and simultaneous bridge/routing.

The PathWise/7609 dual port bridge allows Ethernet Version 2 or IEEE 802.3 workstations to communicate with 4 or 16Mbps Token Ring LANs.

The PathWise/7622 dual port Token Ring bridge can also support point-to-point connections or any-to-any frame relay connections through the primary WAN port. Utilising two processors, including an ISC dedicated to WAN port functions, the new bridge provides expanded memory, dual flash memory and associated configuration information, which supports simplified code download updates.

The product's SNMP capability is supported by an SNMP agent which provides full monitoring and control capabilities compatible with all standards-based SNMP management platforms. It also supports MIB II, RFC, and Andrew Corporation's own management information base extension which uses many configuration parameters, operational parameters and performance indicators not supported by the standard MIB or RFC.

**Andrew Australia (03) 357 9111**

## Token Ring Bridges

Andrew Australia has expanded its Token Ring product range

## Token Ring NICs

Proteon has added a new Rapi-Driver for SCO Unix System V/386 to its ProNET-4/16 Token Ring adaptor product line. The new software enables PCs run-

ning SCO Unix System V/386 to connect to a ProNET-4/16 Token Ring Network. Supporting the SCO/Lacham/Retix Logical Link Interface specification, the new adaptor is compatible with all SCO protocols, including TCP/IP and NetBEUI.



3Com's new routers support line speeds of up to 7Mbps

## 3Com Unveils New Routing Architecture

3Com has unveiled a new approach to connecting remote sites to enterprise networks. Dubbed 'Boundary Routing System Architecture,' the new approach optimises remote site routers for the most common internetworking configuration — a single link to the corporate WAN. It achieves this by shifting most of the routing decision-making task from the remote site to a central router, thus simplifying the installation and maintenance of remote routers and reducing their cost.

New software for 3Com's NETBuilder II router provides the basis for the new architecture, which requires at least one of the high end products to be attached to the corporate network backbone. However, 3Com says that Boundary Routing software will run on a network that includes standards-based devices from other vendors and the company plans to submit the specification to the Internet Engineering Task Force in November. In the meantime, 3Com will offer Technical Service Agreements to other vendors wishing to utilise the approach.

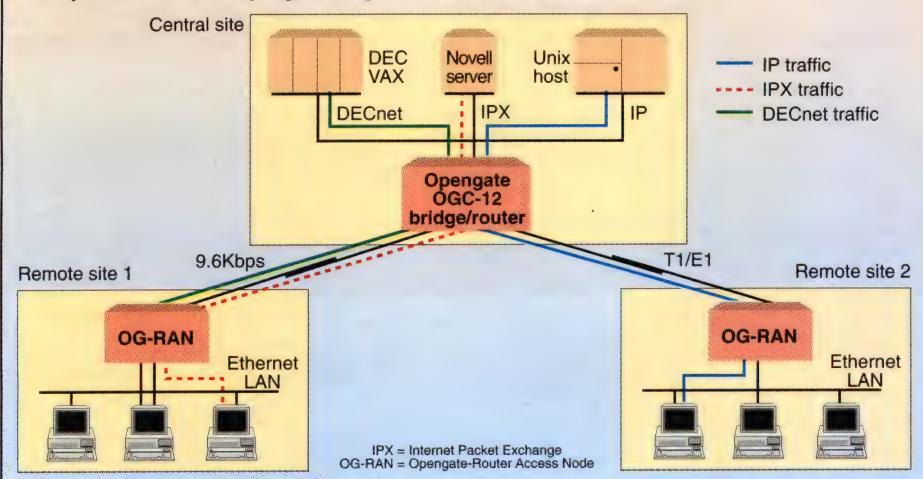
New hardware also forms part of the Boundary Routing approach, according to Nick Jackson, General Manager of 3Com in Australia and New Zealand.

Priced from \$6,350, NETBuilder Remote Control is a 1x1 (LAN-WAN port) router which acts as a Boundary Routing client and provides a single link to the corporate LAN. Company officials say it can be installed in five simple steps and then be easily administered from a central site. Priced from \$5,450, the company's new LinkBuilder ECS Remote Control Module integrates full boundary routing and bridging capabilities in LinkBuilder ECS four and 10-slot intelligent hubs. Also announced was a new 1x1 conventional router, the NETBuilder Remote Access, and a \$535 upgrade kit for LinkBuilder ECS 1209 Remote Bridges designed to deliver remote control functionality. Each router supports Ethernet, Token Ring, RS-232, V.35 or RS-449 ports and can handle line speeds from 2.4Kbps to 7Mbps. The company also announced that NETBuilder, its 2x2 router, has been renamed the NETBuilder Remote.

**3Com (02) 959 3020**

## A Choice of X.400 Connections

RAD Network Devices' Opengate-Router Access Nodes (OG-RANs) allow routing of traffic from remote sites without the need for routing software at each site. The OG-RANs appear locally connected to an Opengate bridge/router at a central site.



## RND's Centralised Approach to Remote Routing

When connecting remote sites to the corporate backbone, putting a full-scale router at each location may be *too* distributed an approach. For one thing, each remote router requires attention whenever the network configuration changes. For another, each device sends routing tables across the wide area, consuming bandwidth. RAD Network Devices (RND) takes a more centralised view of remote routing. Its Opengate-Router Access Node (OG-RAN) connects remote sites and supports routable protocols — without any routing software at the remote site.

RND's approach, called Central Access Routing (CAR), calls for OG-RANs at each remote site and an Opengate bridge/router at a central location. The OG-RANs appear locally attached to the bridge/router, which handles all routing functions (see figure). Because remote sites are connected in a star topology, the OG-RANs do not have to make routing decisions and thus do not require routing software.

Putting the routing software at a central site greatly simplifies the process for making changes in network configurations. Whenever changes are needed in routing software (say, the addition of a new protocol on the network), network managers only have to update one device — the centralised bridge/router. Additionally, no routing expertise is needed at the remote sites, making it easy to install and con-

figure the OG-RANs. Also, no routing tables need to be exchanged between sites.

The Opengate-Router Access Node has one LAN port and two WAN ports. Supported LAN interfaces include 10Base-T, 10-Base-2, and 10Base-5. The company says Token Ring interfaces will be available in the second quarter of this year. One WAN port supplies the main link to the central site, and the other is intended for dial backup in case of a link failure. Both wide area network ports support link rates of up to 2.048Mbps.

Like other remote access internetworking devices, the OG-RAN supports most commonly used routable protocols, including DECnet, IPX and TCP/IP. Support for OSI and AppleTalk is expected to be available by mid-year, RND says.

The OG-RAN forwards 3,100 packets per second (pps) and filters at the maximum Ethernet rate of 14,880pps. Each frame received by the OG-RAN can be subjected to 18 different filters. An optional card performs data compression; according to the company, a typical compression ratio is 4:1. The card is slated to be available mid-year, according to RND. OG-RAN has an SNMP agent and can be managed using a RAD Network Devices Multiman network management station.

**Toren Computer Communications**  
**(03) 242 5050**

Both the driver and adaptor are functionally interchangeable with the IBM 16/4 network adaptor which supports all IBM device features such as source routing and local addressing.

According to Proteon, the RapiDriver for SCO delivers up to 25% higher throughput in

typical file transfer applications than the IBM 16/4 adaptor. In addition, officials say the product's architecture takes full advantage of the bus master DMA feature on most ProNet-4/16 adaptors, delivering high throughput and low CPU utilisation.

**Proteon (02) 412 0050**

Available for unshielded and shielded twisted pair wiring environments, the new MAUs connect up to eight workstations to a Token Ring network and are equipped with connectors allowing additional MAUs to be connected. The shielded twisted pair version can accept up to 254 workstations, while the unshielded twisted pair version connects up to 72 workstations.

All station ports on the new MAUs possess indicators which identify link status and provide troubleshooting.

According to company officials, the units require no external power connection as small amounts of power are drawn from the network. Supporting the IEEE 802.5 standard, the products are also functionally equivalent to the IBM MAU 8228, company officials said. Both MAUs are priced at \$875. **Hypertec (02) 805 0111**

## Cordless Phone

Telecom has introduced the first in a new range of low cost cordless telephones which overcome the line quality problems that have plagued widespread acceptance of the technology to date.

The first model, the Freedom 100, uses what Telecom calls 'advanced sound resolution' to minimise noise and interference as well as advanced digital technology to prevent phantom ringing and boost security, company officials said. Each model will have over 10,000 codes which are changed randomly whenever the handset is recharged to minimise the chances of anyone using the number illegally.

The Freedom 100, which is priced at \$199, also features last number redial, low battery indicator and mute facility.

**Telecom Technologies**  
**(03) 818 3888**



The new Telecom Freedom 100 is priced at \$199

## Token Ring MAUs

Complimenting the HyperRing range of adaptor boards is a new range of IBM-compatible Token Ring multistation access units released recently by board specialist Hypertec.

## Wireless Networking

A new laser-based connectivity product released by ADE Network Technology is able to transmit up to four E1 composite signals between buildings.

Replacing the company's LCI C/1.4 system, the new Terabeam C/1.4F Turbo Quad uses a fibre optic cable rather than two coaxial cables to link the interface/multiplexer (I/M) with the new C/1.4F unit.

Officials say the new product increases the distance between the I/M and the laser unit from 75 to 1,000 metres, and provides superior performance to the old product.

According to company officials, the use of fibre optics also eliminates the threat of lightning strikes travelling down the connector wire to the equipment room, and eliminates the need for coaxial line driver amplifiers and potential RFI/EMI and ground loop problems associated with copper wire runs.

Priced at over \$55,000, the new C/1.4F laser transmission unit can simultaneously transmit and receive signals at distances of up to one kilometre and is suitable for multi-building or other campus applications.

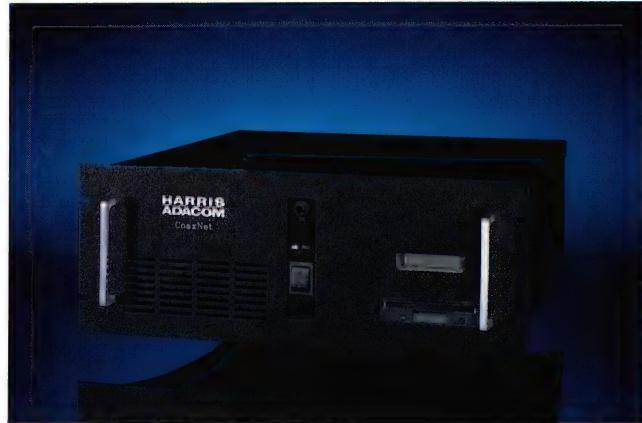
**ADE Network Technology**  
(03) 543 2677

## LAN-Host Bridge

Dataplex has recently introduced CoaxNet, a new LAN bridge from Harris Adacom that allows users to attach PCs with 3270 coax boards to a Novell NetWare-based LAN.

The new CoaxNet attaches to either a Token Ring or Ethernet Novell LAN and provides full NetWare services to all coax attached PCs. Company officials claim that it will revitalise the large installed base of personal computers with IRMA-type emulation boards which are linked via IBM 3270 coaxial wiring.

**Dataplex** (03) 735 3333



CoaxNet provides full NetWare services to coax-attached PCs

## Router-SDLC Links

Cisco Systems has developed a connector which simplifies the attachment of its AGS+, MGS and CGS routers to IBM SDLC devices such as front end processors, cluster controllers and PC gateways.

Cisco's SDLC applique eliminates the need for SDLC cluster controllers to pass through standalone converters or be recon-

figured for attachment to Cisco routers running serial tunnel or SDLC-to-LLC2 conversion.

Supporting both data encoding systems used by IBM SDLC controllers, the applique facilitates emulation of half-duplex operation when configured as a DCE. In addition, the company intends to enhance the SDLC interface on its routers to support half-duplex operation when configured as a DTE device.

**Cisco Systems** (02) 957 4944

# New LAN Tester Has It All



- NEXT, Attenuation and Noise Tests
- LAN Monitor
- Cable Certification Reports
- Wire Map
- TDR

**Complete Test Functions.** The Datacom Technologies LANcat 1500 has the functions needed by a LAN manager or installer. LANcat 1500 makes the necessary tests to certify cable for proper LAN operation. It finds all the problems on the cable, not just the biggest. It stores the results from 50 tests and then prints out cable certification reports.

**Easy to Use.** One look at the LANcat 1500 shows how easy it is to use. The rotary function selector eliminates the confusion of multi-level menus. Simply turn the rotary selector to AUTOTEST, select the cable, and that's all. In 15 seconds the screen shows the results - automatically. The four line display gives a clear picture of the results without getting lost in endless key-pushing.

|                | <b>LANcat 1500</b> | <b>MT340</b> | <b>PairScanner</b> | <b>CableScanner</b> | <b>Startek</b> |
|----------------|--------------------|--------------|--------------------|---------------------|----------------|
| Connectors     | BNC, RJ45          | BNC, RJ45    | BNC RJ45           | BNC, 14 Pin         | RJ45           |
| NEXT           | Y                  | Y            | N                  | N                   | Y              |
| Attenuation    | Y                  | Y            | Y                  | N                   | Y              |
| TDR            | Y                  | Y            | Y                  | Y                   | Y              |
| Noise          | Y                  | Y            | Y                  | Y                   | Y              |
| User Interface | Rotary Dial        | Button/Menu  | Button/Menu        | Button/Menu         | Menu           |
| Display        | 4 L x 16 ch        | 2 L x 16 ch  | 2 L x 16 ch        | 2 L x 16 ch         | 2 L x 16 ch    |
| Wire Map       | Y                  | Y            | Y                  | N                   | Y              |
| LAN Monitor    | Y                  | Y            | No 10BASE-T        | No 10BASE-T         | N              |

**ELMEASCO**

**ELMEASCO INSTRUMENTS PTY LTD**

**NEW SOUTH WALES**  
**VICTORIA**  
**QUEENSLAND**  
**SOUTH AUSTRALIA**  
**W. AUSTRALIA**

18 Hilly Street, MORTLAKE Tel : (02) 736 2888 Fax : (02) 736 3005  
12 Maroondah Highway, RINGWOOD Tel : (03) 879 2322 Fax : (03) 870 8972  
192 Evans Road, SALISBURY Tel : (07) 875 1444 Fax : (07) 277 3753  
241 Churchill Road, PROSPECT Tel : (08) 344 9000 Fax : (08) 269 6411  
32 Teddington Road, VICTORIA PARK Tel : (09) 470 1855 Fax : (09) 470 3173



Expertech's MDT-301 combines radio and peripheral interfacing

## Mobile Data

Expertech has developed a microprocessor-based Mobile Data Terminal for messaging and interaction on a radio communications network.

Designed for all courier, taxi and service organisations, the new MDT-301 combines all radio and peripheral interfacing in one unit, which connects directly to most standard UHF/VHF radios.

The product consists of a four line by 40 character LCD display; numeric keypad with

Clear and Enter buttons; eight function keys which provide direct status input and multiple functions with soft menu selections; a Key Tag Reader which allows drivers to identify themselves for work or control access to the data network; and an Injection Molded Plastic enclosure with steel sub-chassis.

Providing all the necessary encoding and decoding required for high speed data transfer, the MDT incorporates a number of features including two RS-232 serial peripheral interfaces for GPS navigation units, vehicle engine management units, bar-

code readers and a general purpose set of input status lines.

In addition, an optional internal module enables the terminal to act as the front panel to selected radio brands, providing microphone input, electrical volume and squelch control.

**Expertech (02) 880 2157**

## Ethernet Bridges

Australian-based data communications equipment manufacturer INC Manufacturing has developed two new Series 6000 Ethernet bridges to aid in network administration.

INC's new 604B bridge is designed to connect IEEE 802.3 LANs running any combination of TCP/IP, XNS, IPX, DECnet, LAT or ISO traffic, and to segment high traffic work groups off the backbone. Featuring a self-learning algorithm which supports a 10,000 name address table, the INC 604B listens to network traffic to determine the position of all network devices,

and then stores those addresses in memory. The product filters 27,000 pps and forwards 14,720 pps and features AUI and BNC ports for attachment to standard thick or thin Ethernet coaxial cable-based LANs along with a universal internal self-sensing power supply.

The second bridge in the series is the 604M fully SNMP-managed local Ethernet bridge providing a hands-off method of connecting LANs and running any combination of TCP/IP, IP, XNS, DECnet, LAT or ISO traffic in both managed and non-managed environments.

Support for the IEEE 802.1 Spanning Tree algorithm enables multiple 604M bridges to be installed to provide backup routing. The bridge also eliminates looping conditions and provides support for customised Multicast Address, Source Address and Protocol Type filtering, according to officials.

Network management is provided by the bridge's SNMP agent which supports MIB II and



**SUBSCRIBE  
NOW**

# The communications revolution holds the key to the future of information technology

Australian Communications is the magazine dedicated to the coverage of the rapidly growing data and telecommunications industries... Subscribe to Australian Communications and save 15% off the newsstand price.

22 issues, two years, for \$96 (save 20%)  
 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AU\$.....

Bill my company      Authorising signature.....

Charge my:  Amex  Diner's  Visa  Bankcard  Mastercard

No..... Expires.....

Name.....

Company.....

Address.....

Postcode.....

Signature.....

**Post to: Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000**

**OR: Fax your application to us on (02) 264 2244**

is compliant with RFCs 1156, 1157 and 1158 and also TCP/IP RFCs 791 and 793.

**INC Manufacturing**  
(047) 396 111

### SNMP Bridges

Netronix has added SNMP support to its TokenMaster line of local and remote Token Ring bridges to enable network managers to gather statistics, receive error data, or change the configuration of the bridge from the SNMP management station.

The TokenMaster bridges are able to support all IBM LAN Manager/NetView options and offer MIB II support, Netronix Extension, bridge control, Netronix MIB and a trap reporting facility. Also included is Netronix's own subset of MIB II which is designed according to RFC-1212 and includes the System Group, Interface Group and the SNMP Group.

**Infotron Systems**  
(02) 417 7366

### Token Ring MAU

Danish Token Ring hardware specialist Olicom has released a new multistation access unit for unshielded twisted pair Token Ring environments.

The company's new UTP MAU connects up to eight stations and supports 4Mbps and 16Mbps Token Ring networks. It is rack mountable and contains an internal power supply together with LED indicators for each lobe.

**Force Technology**  
(02) 971 1000

### PC-Mac Links

The new Farallon Timbuktu network application software will enable Apple Macintosh computers and Microsoft Windows-based personal computers to share networking capabilities such as printing, electronic file exchange, and remote access and control of either platform.

Announced recently by NetComm, the cross-platform Timbuktu for Windows version 1.0 and Timbuktu for Macintosh version 5.0 include a screen sharing feature which allows users of each system to work together in real-time across a mixed network without a file server. Timbuktu for Macintosh version 5.0 also now includes a complete System 7 application, which simplifies access to Timbuktu sessions, along with an on-line help service.

Each software package retails for \$299 and is available in 10, 30 and 100 user versions.

Also offered in conjunction with the two new Timbuktu products is version 3.0 of Farallon's PhoneNET PC software which provides AppleTalk connection for DOS and Windows users. It features Microsoft Windows versions 3.0 and 3.1 compatibility along with a Chooser For Windows to let PC users browse and use AppleTalk network printers and servers.

PhoneNET PC version 3.0 software is priced at \$299, while a Timbuktu for Windows PhoneNET Kit, including a LocalTalk PC card is priced at \$649.

**NetComm** (02) 888 5533



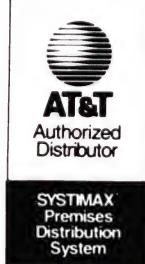
Olicom's UTP MAU supports 4Mbps and 16Mbps Token Ring networks

# WE CAN DO IT

## Full motion colour video & audio using UTP cable.

The new 380A and 381A series adaptors support video, audio, & RGB transmission over standard or enhanced performance UTP cable.

When you really need a solution you can count on AT&T Network Cabling Systems.



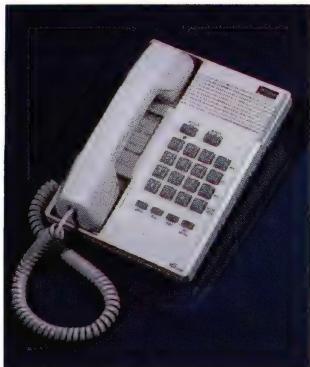
Applications include:

- Security/surveillance monitoring
- Education training
- PC's equipped with a video card
- Production monitoring
- Airport displays
- Single channel CATV feed
- Remote medical monitoring.



allNET Technologies Pty Ltd  
Unit 8, 3 Gibbes Street, Chatswood, NSW 2067  
Telephone (02) 417 4800 Facsimile (02) 417 2281

For more information on this and other products call allNET Technologies, the authorised AT&T SYSTIMAX PDS distributor.



Interquartz has added paging to its business telephone range

## Paging Telephone

Interquartz has developed what company officials claim is a new concept in discreet paging for its Interquartz Business Telephone range.

Dubbed IQTEL-Epage, the new function allows users to page from any telephone in their business premises by simply dialling an access number. The paging announcement can be directed toward a single exten-

sion, an office section or every extension connected to the same PABX.

IQTEL-Epage can also be expanded into TELE-ACCESS to open doors, TELE-SWITCH for comfort control and the conservation of power resources and TELE-EVACUATION for other warnings.

**Interquartz (03) 457 5000**

## Mac-AS/400 Links

Andrew Australia has released a new emulation software package which allows Macintosh users to share IBM AS/400 sessions over Ethernet.

Known as TCPAxcess, the new emulation software utilises Apple Computer's MacTCP to communicate with TCP/IP connectivity utilities on an IBM AS/400. According to company officials, TCP/IP's Telnet protocols work in conjunction with TCPAxcess to offer IBM 5250 emulation to every Macintosh on the AppleTalk network.

AS/400 Office, IBM's host-resident word processing program, is also supported by the software, as are all third party Macintosh Ethernet and Token Ring cards.

The product includes front-ending toolkits to provide custom user interfaces for task automation, while file transfer capabilities are available via ETU, Andrew's host-based file transfer utility. Other features of TCP-Axcess include keyboard remapping, auto-key for frequently used keystrokes and resizable windows.

Priced from \$530, the new product is available in 1, 8, 32, and 64 simultaneous workstation session capabilities.

**Andrew Australia (03) 357 9111**

## Accelerated Bridging

The latest TokenMaster 2000 local Token Ring bridge from Netronix incorporates a series of modifications — known as the

Token Ring Interface Accelerator — which, officials say, enables the bridge to attain near wire speed.

The Token Ring Interface Accelerator is designed to increase the aggregate throughput of the IBM Token Ring mini-module used in the Netronix TokenMaster bridge, allowing it to achieve speeds of up to 15.4-Mbps with large packets.

Using the standard TI chip set, the new development is best suited to applications which utilise frames of 500 bytes or larger, like electronic mail, file transfer and imaging.

**Infotron Systems (02) 417 7366**

## cc:Mail For OS/2

Lotus Development recently announced an object-oriented version of its cc:Mail electronic mail program for the IBM OS/2 Workplace Shell.

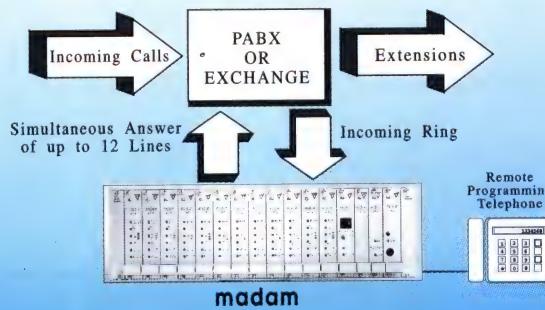
Taking advantage of the OS/2 2.0 Workplace Shell graphical

## At Last! A Real Multi-line Digital Answering Machine

**madam** is a multi-line digital telephone answering machine which has the ability to answer up to 12 lines simultaneously and totally independantly.

Each of **madam's** 12 lines can be remotely programmed and recorded for automatic announcements such as:

- \* Call Queuing
- \* Call Distribution (ACD)
- \* After Hours Information
- \* Music on Hold
- \* Advertising on Hold
- \* Emergency messages



### Key Features

- \* Digital Voice Storage
- \* High Quality Output
- \* Remotely Programmable
- \* 12 Line Capacity
- \* 12 Line Replay at Once
- \* 3 Replay Modes
- \* Failsafe Memory
- \* No EPROMS to change
- \* No Moving Parts
- \* Modular Rack Mounting
- \* 2 or 4 Wire Connection

**YCOM** Pty Ltd  
Telecommunications  
A.C.N. 056 218 887  
PO Box 156 Crows Nest NSW 2065



**Fax or Post this coupon to Ycom Pty Ltd on (02) 964 9988**

Please send me your **madam** Product Data Sheet.

Ycom Pty Ltd PO Box 156 Crows Nest NSW 2065

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

POSTCODE \_\_\_\_\_

PHONE \_\_\_\_\_

FAX \_\_\_\_\_

user interface, the new product speeds processes such as sending, receiving and organising messages.

According to company officials, OS/2's multi-tasking and multi-threading capabilities let users send mail without exiting to their e-mail programs, and to process messages in the background. Features of the product include bulletin boards, public and private mailing lists, fax viewing, a Message Template Object, a Boolean search tool, and a status window.

Company officials explained that the new product presents all traditional mail functions as desktop objects, each of which features a SmartIcon palette for quick access to commonly used functions. Objects may be moved anywhere on the desktop or shadowed to multiple locations within the Workplace Shell, which officials say enables organisation of data into folders related to a specific project.

**Lotus Development**  
**(02) 286 1800**

## Fast Servers

Memorex Telex has boosted the performance of its server range by adding two new models based around Intel's new 486DX2 66MHz microprocessor.

According to company officials, the 66MHz CPU boasts a 30% performance improvement over 50MHz products in mission-critical applications.

The company's new 8630 and 8640 servers are priced from \$40,000 and company officials say they are well-suited to heavy duty processing requirements.

**Memorex Telex (02) 805 5805**

## ISDN Testing

Wandel & Goltermann has extended its range of ISDN test equipment with a new bit error tester for primary rate access.

Based on the same concept as the company's basic access ISDN bit error tester, IBT-1, the new IBT-2 tester is designed for

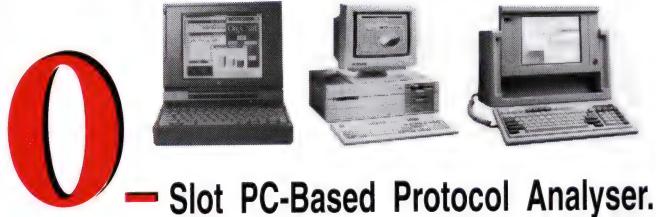


*Wandel & Goltermann's IBT-2 is designed for ISDN testing*

the commissioning of primary rate access lines before the installation of a PABX.

In order to establish communication, IBT-2 simulates an ISDN terminal connected to a

primary access line, then tests the protocol and various ISDN services, and allows G.821 qualification of the primary access. According to company officials, all results, error ratio tests, and



**Turn ANY PC**  
into a full-featured Protocol Analyser

**EVEN NOTEBOOK**

with

**SERIALTEST**

- \* Connect SERIALTEST to parallel printer port.
- \* No expansion slot required.

### **SUPPORTS**

ASYNC, SYNC, SDLC, HDLC, SNA, X.25  
level 2 and level 3 decode, RS-232  
(optional X.21, V.35) up to 64KBPS.

**CALL OR FAX FOR MORE INFORMATION.**



Unit 3a, 3 Lanceley Place  
Artarmon, NSW, 2064

INFORMATION NETWORK SOLUTIONS  
PHONE: (02) 906 - 6335 FAX: (02) 906 - 6327

## EXFO Fiberoptics Test Equipment



INS offers the most comprehensive and complete range of fiberoptic test instruments. This includes: Powermeters, Attenuation Meters, Dual-Wavelength Meters, LED or LASER Light source, Back Reflection Meter, Optical Talk Set, LAN / WAN / FDDI Test Kit, PC - Based OTDR and more.

**CALL OR FAX FOR MORE INFORMATION.**



INFORMATION NETWORK SOLUTIONS  
PHONE: (02) 906 - 6335 FAX: (02) 906 - 6327



Alcatel's 4300 PABX features a Voice Prompt for ease of use

protocol anomalies can also be dumped with the unit's integrated printer.

**Wandel & Goltermann**  
(03) 690 6700

### Alcatel PABX

Alcatel Australia has announced the launch of a new PABX range which the company claims embodies a whole new communications concept.

The new Alcatel 4300 PABX features a tutoring facility called Voice Prompts which talks to users advising available options and steps to take. For example, a caller reaching busy extension could be advised to enter a code activating the camp-on or callback facilities. Company officials say that this new approach overcomes many of the problems inherent in many current generation PABXes which can be complicated to use.

The 4300 is a fully digital software-driven system which is able to operate in a standalone fashion or be integrated with existing computer systems for applications such as telemarketing. It features TIMS call accounting, automatic call distribution, traffic analysis, automatic least cost routing, voice mail and hospital/hotel applications as integral components. It is managed from a single SMART (System Management and Reporting TIMS) terminal.

Available in various system configurations offering up to 860 ports, the 4300 also features a PC-based operator's console, which, using Windows, enables the operator to switch from PC-based applications to PABX operator mode.

**Alcatel (02) 699 0044**

### Satellite Links

A new satellite terminal released by Scientific-Atlanta will provide global telephone, fax and

data communications to ocean liners and small vessels through the Inmarsat satellite network.

Called Maristar-M, the compact system comprises an above deck, randome protected, stabilised antenna and a small, below-deck electronics and communications unit.

Operating like a normal telephone system, Maristar-M provides automatic call set-up to any international telephone, fax or data terminal. The system boasts automatic antenna pointing and tracking along with an internal GPS receiver, digitised voice messages available in any language, user access code security with up to 100 unique, 4-digit PIN codes, and automatic call logging whereby the last 100 calls are saved and printed.

Priced at around \$45,000, the system also acts as a global positioning device whereby the precise position of a vessel carrying the Maristar-M can be determined automatically.

**Scientific-Atlanta**  
(02) 452 3388

## COULD ONE WAN ANALYSER BE SHARP ENOUGH TO HANDLE TODAY AND TOMORROW'S NETWORKS?



The all-in-one tool for ASYNC to ISDN to Frame Relay networks from 50bps to 2Mbps. The LM 2000 is a PC-based Network and Protocol Analyser designed for solving problems on multi-vendor, multi-protocol and multi-speed diversified WANs.

#### Performance

- Monitor and BERT (G.821) 50bps to 2Mbps
- Fast capture to RAM at 2Mbps
- Stream to disk up to 1Mbps
- On board interfaces: RS232, V.35, RS422/423, V.10/V.11, RS449
- T1 Pod (E1 coming soon)

#### Protocols

- HDLC/X.25/X.75
- SDLC/SNA & QLLC
- ISDN/Q.931
- DDCMP
- TRANS
- Frame Relay: LMI, CLLM, Q922, ANSI T1

#### Functions

- Real time pre-capture filters
- Level 2 and Level 3 statistics
- Frame Relay statistics for up to 256 DLCIs
- Full plain English protocol decodes
- Programming languages with library of ready-made test applications

**PCI**  
**The complete family of PC-based WAN Protocols Analyzers**  
**WAN Protocol Analyzers**  
A solution for every network!  
• LMI • LMI • ISDN telScope  
• LMI • LMI • ISDN telScope

# TESTCOM-DATA

217 North Rocks Road, North Rocks NSW 2151  
Telephone: (02) 630 7528 Fax: (02) 630 7226

## Video Over UTP

A new adaptor from AT&T Network Cabling Systems will enable transmission of full motion colour video over unshielded twisted pair wiring.

Released in Australia by all-NET Technologies, the 380A series adaptor is equipped with an 8 conductor/8 position modular jack, two standard RCA jacks and a BNC jack.

The 8 position modular jack connects the adaptor to the unshielded twisted pair wiring of Systimax SCS, PDS, or IBS via the information outlet at the workstation location using Level 2 to 5 patch leads.

The BNC jack connects the baseband video equipment's video signal, while the two RCA jacks connect the audio.

**allNET Technologies**

(02) 417 4800

## PC-AS/400 Links

INC Manufacturing recently extended its product family to include the INC 4597A 5250 enhanced emulation card which enables connection of PCs to an IBM AS/400.

Providing full 5250 emulation, the new card requires no additional software or hardware and by utilising VLSI technology, it is able to work with high speed computers up to 33MHz.

Priced at \$799, the card supports IBM System/34, System/36, AS/400 and IBM 5294 and 5394 remote workstation controllers. PC features supported by the INC 4597A include monochrome, CGA, EGA and VGA monitors, and all standard PC keyboards.

**INC Manufacturing**

(02) 525 8411



The 380A allows for the transmission of video over UTP wiring

## Entry-Level LAN

Announced recently in Australia by Australasian Memory was an entry-level LAN solution developed by Kingston Technology.

Dubbed EtheRx, the solution currently comprises a network interface card based on Advanced Micro Devices' PCnet-ISA Advanced Ethernet Controller, and a Multi-port 10Base-T Concentrator.

According to company officials, the new interface card takes advantage of high level Bus Mastering Direct Memory Access technology, which enhances network performance. It is also compatible with most leading network operating systems including Novell NetWare, Artisoft LANtastic, Microsoft Windows for Workgroups, and LAN Manager.

The company's new concentrator includes eight RJ-45 interfaces and one AUI interface, enabling the installation of a wide range of system configurations. The concentrator serves either as a standalone device for smaller networks or as a node in more expansive configurations.

Future versions of the EtheRx product line will include additional cable interfaces, FDDI capability, an external LAN adaptor, PC/MCIA units, and a range of concentrator capacities.

**Australasian Memory**

(02) 899 5637

## Host-Token Ring Links

Sync Research has developed a product able to connect SDLC/SNA controllers with IBM Token Ring networks.

Released now in Australia by Network Systems Technology, the new miniSNAC is a single board package said to increase throughput, and decrease support and telecommunications costs. Based on SNAC/TRC software and hardware technology, miniSNAC is an integral node in the SNA network and is managed remotely by NetView and also Sync's SNAC/Talk PC program.

Connecting SDLC controllers on a Token Ring to an IBM host through 37xx front end processors, 3174 gateways, 3172 interconnect controllers, and AS/



Cisco claims 110,000pps performance for its new 7000 router

## Cisco Claims Router High Ground

Cisco Systems has raised the stakes in the ongoing router performance battle with the release of a new router platform claimed to perform at the highest speeds available today while providing a foundation for new technologies such as ATM.

Quoting recently undertaken Harvard University tests to substantiate its claim, Cisco says that its new 7000 Internetwork Router offers 110,000 packet-per-second performance which is a massive 50% boost over the performance of the company's existing AGS+ product line.

Housed in a standalone or rack-mountable chassis, the router uses a loosely-coupled multiprotocol architecture in which a Switch Processor handles real-time operations, forwarding traffic between multiple interface processors. A separate Route Processor handles non-real-time tasks, sending and receiving routing protocol updates, performing routing calculations and monitoring interface status, according to Cisco officials. The device incorporates a 'Tri-Bus' design which allocates system overhead and interprocessor communication to the first two buses while leaving the 533Mbps data bus free for passing switched data between interfaces.

The Cisco 7000 also offers two full 700 watt current-sharing backup power systems, either of which can be hot-swapped while the system is running. Five available chassis slots can accept a variety of interface processors to link up to 30 Ethernets, five FDDI rings, 20 Token Rings, 40 WAN serial ports or any media combination, officials claim. Pricing for a Cisco 7000 with route and switch processors starts at \$44,000 while interface processors are priced from \$10,000 to \$49,000.

The company also claims that between now and 1994, the performance of the 7000 family will double through the use of 'silicon packet switching technology.' In addition, the product will receive an ISDN Primary Rate interface, IBM channel interface and, eventually, a native ATM interface. Sometime in 1994, Cisco 7000s will form a 'routing cluster' able to act as a switch for up to 240 Ethernets, 150 Token Rings, 24 FDDI rings or 800 high speed lines.

**Cisco Systems** (02) 957 4944

400 and 9370 systems, the new product supports up to 16 downstream PU1, PU2.0 or PU2.1 controllers on SDLC multi-drop

or point-to-point lines. The new product is priced from \$8,715.

**Network Systems Technology** (02) 957 3880

# 'Over 70% of Australia's top 1000 companies are now using EDI'\*

Electronic Data Interchange (EDI), or paperless trading, is the way of the future. Australia's top companies have realised it. Isn't it time your company realised it too?

EDI is a computer-to-computer data transaction which replaces paper transactions in the purchasing cycle and in other areas of business. Australia's top companies have found that it leads to significant cost reductions and productivity gains, as well as better business and trading relationships. EDI can reduce inventory costs in the purchasing cycle by up to 90%.

To promote a better understanding of EDI, so more Australian companies reap its benefits, the Department of

Administrative Services, in conjunction with Standards Australia and the EDI Council of Australia (EDICA), has developed the *EDI... A Better Way* kit.

The kit clearly explains terms, technology and practices used in EDI. It consists of an overview booklet; two videos; a handbook which explains terms, standards, systems and business issues; and an interactive presentation on computer disk.

If you wish to purchase the *EDI... A Better Way* kit, or if you would like more information, please contact Standards Australia Marketing Services on (02) 746 4700, or fax us on (02) 746 8450.

## Don't get left behind

**STANDARDS AUSTRALIA**

1 The Crescent, Homebush NSW 2140



## A Matter of Choice — Implementing Carrier Preselection

Optus Communications, Australia's new telecommunications carrier, has begun offering national and international long distance services in competition with Telecom. Service in Sydney, Melbourne and Canberra started in the middle of November last year and will extend progressively to other capital cities and regional centres over the next five years.

At present, telephone customers are able to access and use Optus long distance services by putting the digit '1' in front of the national or international number they normally dial. For example, to call Perth using Optus, customers would dial 1 09 followed by the local Perth number. To dial overseas, they would dial 1 0011 followed by the overseas country code and national number. This access arrangement is known as 'Dial 1 Access.'

'Dial 1 Access' will be replaced in the longer-term by 'preselection,' an access arrangement by which each customer will have the opportunity to choose the carrier — Telecom/OTC or Optus — they wish to have as their preferred long distance service supplier. Their telephone service will then be configured in the local telephone exchange so that long distance calls will automatically be provided by the carrier of their choice.

However, customers will always be able to select and use the other carrier on a call-by-call basis by dialling its four-digit carrier selection or 'override' code. Both of the access arrangements — the initial interim Dial 1 Access and the longer-term preselection — are mandated by the carriers' licences.

During the past few months, Telecom/OTC and Optus have been negotiating on the design of the preselection scheme. With the assistance of Austel, they have reached broad agreement on an overall framework and principles. They are now working out the details of the scheme. These will be documented as a schedule to their Access Agreement which, provided it meets the objects of the legislation, will be registered with Austel under Part 8 of the *Telecommunications Act, 1991*.

Austel has given the two Australian telecommunications carriers initial guidance on a wide range of consumer and other issues which it considers will need to be appropriately addressed in the final preselection access agreement. Austel is also consulting fully with user, consumer and industry groups on these issues and has invited interested parties to submit their views and concerns. This will ensure that preselection is implemented in a way which safeguards the interests of consumers, including their rights to privacy and freedom of choice and provides customers with an orderly process through which they can exercise and express their choice with knowledge of both carriers' services.

Under preselection, customers will be given the opportunity to make their initial choice of carrier through a ballot. The balloting arrangements will be conducted area by area, during a four year period, commencing in the second half of 1993. The actual timing of the ballot in each area will be related to Optus' service availability and the capabilities of Telecom's network.

The ballot will not force customers to choose a preferred carrier. However, it will be designed to facilitate and encourage a high level of customer response. Those who don't respond to the ballot will preserve their existing arrangements. This means that their national and international long distance calls will continue to be carried by Telecom/OTC unless they dial Optus' four-digit override code on particular calls.

Customers will be able to change their choice of preferred carrier at any time after the ballot is concluded. The arrangements and procedures for changing carrier preference will form part of the preselection access agreement.

Customers will receive a bill from each carrier they use. For example, if they make calls through both Optus Communications and Telecom/OTC, they will receive two bills. The Telecom bill, of course, will continue to include charges for telephone rental and local calls.

### New Faces at Austel

Austel has recently announced three new appointments to senior executive positions within the organisation.

**Rick Campbell** has been appointed Austel's Chief Operating Officer. His previous position was as General Manager of the Defence Division of Aerospace Technologies of Australia.

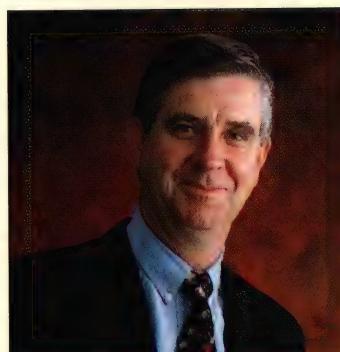
Mr Campbell holds a Bachelor of Engineering (Aeronautical) degree from the University of Sydney. Following his graduation, he joined the RAAF, rising to the rank of Wing Commander. He was the Officer in Charge, Research and Development Unit, which was responsible for the management of all RAAF research, development, test and evaluation projects and project support.

To enhance Austel's consumer focus, the role of the Consumer Affairs Branch has been expanded to include responsibility for the administration of price controls.

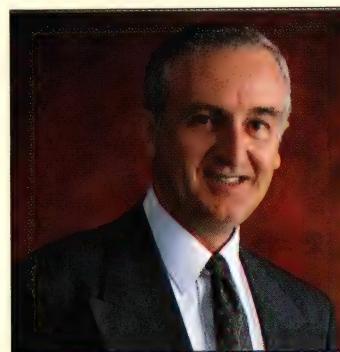
**John MacMahon** joins Austel as General Manager of the new Consumer Affairs Branch. Mr MacMahon comes from a background in social welfare and worked in the Department of Social Security's Central Office in Canberra for some 21 years. His professional experience embraces senior responsibility for research, policy development and benefit administration and legislation.

In addition, **Ms Lesley Gordon** has recently commenced work as General Manager, Corporate Resources Branch.

In announcing the appointments, Austel Chairman, Rob Davey, said that he was confident the new organisation will equip Austel to meet the challenges of Australia's dynamic telecommunications industry.



Rick Campbell



John MacMahon



# The Forum at Asia TELECOM 93 - have a voice in Asia's future

A US\$ 100 billion telecommunications market is on your doorstep. In Asia. Home to half the world's population.

You have the products, the technology, the ideas. But are you talking to the right people?

There is one place where you'll get right to the top. The Asia TELECOM 93 Exhibition and Forum, Singapore, from 17 through 22 May 1993. We'll bring you industry and government officials, technical, economic and legal experts - the decision makers of

the region. You'll be involved in the latest telecommunication developments and have the opportunity to interact with the leaders shaping Asia's telecommunications future.

The Asia TELECOM 93 Forum is organized by the International Telecommunication Union. We're making it the most important event in telecommunications, because we want you to meet the right individuals in a privileged and exclusive environment.

The Forum. To share information with the right people.

## The Forum is built on four symposia:

### Policy Symposium 17-19 May

"Strategy for expanding telecommunications infrastructure"

### Technical Symposium 19-22 May

"Technological challenge: interfacing regional needs"

### Regulatory Symposium 18-19 May

"Effective transition through regulation"

### Economic Symposium 20-21 May

"Telecommunications: the platform for economic growth and development"

**For registration: call +65 290 5821 or 5817 - fax +65 292 7577**

**For information: call +41 22 730 5927 - fax +41 22 740 1013**

*Asia*  
**TELECOM**  
**93**  
SINGAPORE  
17-22 MAY 1993

## Trail Blazers of the New Frontier and Other Telecom Tales

**H**ow much is too much? The Fifteenth Annual Pacific Telecommunications Conference, PTC'93, ended in January with a tally of over 1,100 participants from over 40 countries. Apart from the record 215 papers presented and 41 exhibitors from around the world, new features such as issue-specific Topic Tables, Discussion Groups, and the restructured PTC Telecom Workshop strategic briefings added to the overall feeling of a larger, newly-important event.

For years, PTC's Annual Conference has been a must for many telecom entities. This sense was strongly reinforced at PTC'93, and I believe it is largely reflective of the sheer growth in volume and in opportunity of the telecoms field at large, particularly in the Pacific Hemisphere. PTC'93 was over 10% larger than PTC'92, and PTC's membership growth during the same period was an unprecedented 19%. These figures appear staggering until one looks at the growth rates of the countries of the region; we're only matching the telecom growth rates of countries such as Korea, China, Taiwan, Thailand, Malaysia, and even nascent telecom powers such as Chile, Mexico, or Indonesia. Those who call the Asia-Pacific telecoms market a new frontier are certainly close to the mark. And not only because the amounts of money sloshed about and fortunes to be made are reminiscent of the gold rush. The opportunities often appear limitless, just as they did to early settlers in Australia or North America.

Nowhere is this sense of 'frontier' greater than in the satellite domain. From just over 300 C and Ku band transponders employed in the region at present, the totals for 1997 — only four years away — are envisaged to top 700. Even then, some predict this will barely match the growth in demand. Countries not heretofore known as being on the telecoms vanguard are leaping forward through satellite technologies. If one looks at the national origin of this predicted 1997 Asia-Pacific transponder capacity (see the table below), a few surprises are in store.

Indonesia? Papua New Guinea? Tonga? How did these countries make the satellite hit parade? In fact, Indonesia and India were satellite trailblazers, starting with programmes way back in the early 1970s to harness satellite technology as a means of circumventing

their dismally antediluvian wired telecom infrastructure. These efforts still continue, even though much work remains. The Indonesian Palapa system has been especially effective in linking that disparate country and has indeed grown into a regional force, capable of providing service throughout the Pacific region, from Hawaii to India.

The recent rise of the Kingdom of Tonga as a new satellite powerhouse is also particularly interesting. When the International Telecommunication Union

(ITU) distributed orbital parking slots for geostationary satellites, they were compelled to distribute an 'a priori' number of slots to every sovereign ITU member state. This led to small countries — such as the Pacific Island states — receiving what are, given the size of the countries in question, rather luxurious allocations. Tonga has quite cleverly employed these slots as a national resource, permitting the private Tongasat Organisation to, in effect, act as a broker for satellite organisations seeking to serve the Asia-Pacific region.

Naturally, satellites are seen as particularly important within the Pacific Islands themselves, and not just as launching pads for serving the Asia-Pacific region. Whether, through Tongasat, Intelsat VII, the reconfigured Palapa Pasifik, Papua New Guinea's Pacstar, Inmarsat, Orion, Unicom, and others, satellite links have brought or are bringing the Pacific Islands into the communications age. Only HF radio operators will be sorry to see the 'ancien régime' disappear.

Satellites are not the only telecoms frontier in this part of the world. Ships are plying back and forth across the Pacific laying fibre optic undersea telecom cables. The quality, reliability, capacity and lasting power of these new fibre cables have led to a renaissance for this technology. Cable and satellites may be seen to compete with each other, but the Asia-Pacific market is large enough to provide both with healthy levels of demand. The new fibre cables, particularly the multi-billion dollar, three-ocean-wide FLAG system and several new trans-Pacific ventures, are evolving into a global fibre optic grid. PTC's contribution in this arena is the proposal launched at our Santiago, Chile, meeting in May 1992 for a Pacific Transit Cable (PTC) linking South America and South East Asia. This prescient venture would link Asia's industrial dynamos to the rapidly growing markets of Latin America.

With this rapid growth in capacity, are there any losers? Or, are there any pitfalls for those seeking to get involved in the Asia-Pacific satellite/cable frontier? Not really, although the amounts of money required to get involved are not for the faint-hearted. While the national or regional provision of telecom services should yield fairly rapid returns, there is some evidence that regional satellite broadcasters are facing a tougher battle.

As has been detailed in this column before, Hong Kong's AsiaSat is perhaps the world's most successful example of the international broadcaster of the future. But, as transnational satellite broadcasters in Europe discovered, serving highly diverse broadcast markets is not always easy and is often unpredictable (I wonder if AsiaSat envisaged that two of their largest Star-TV markets would be India and the Persian Gulf States). Japan's ambitious broadcast satellite plans have been thwarted somewhat by the recent financial woes of domestic subscription television. These have been compounded by continuing regulatory constraints on cable distribution of satellite television within Japan.

This issue of regulatory constraints is, in fact, the largest caveat to the overall optimism of this massive expansion in Asia-Pacific telecoms capacity. These constraints will continue to hinder many countries from fully exploiting this new capacity. Some are predicting that even if the international regulatory issues can be resolved, today's fervour will result in tomorrow's over-capacity. Such predictions, however, often underestimate the Asia-Pacific region's potential for growth.

| Asia-Pacific Transponder Capacity |              |
|-----------------------------------|--------------|
| Country                           | Transponders |
| Indonesia                         | 131          |
| Japan                             | 93           |
| Hong Kong                         | 84           |
| USA                               | 71           |
| Papua New Guinea                  | 60           |
| China                             | 58           |
| Australia                         | 47           |
| Russia                            | 44           |
| India                             | 34           |
| Tonga                             | 30           |
| Thailand                          | 24           |
| Malaysia                          | 24           |
| South Korea                       | 15           |

Source: K.Kuhns, *Via Satellite*, January 1993

James Savage is the Assistant Director, Pacific Telecommunications Council and Editor of Pacific Telecommunications Review.

# INS leads the way

## TEST INSTRUMENTATION • NETWORK MANAGEMENT SYSTEMS

### TDR/LAN SCANNER



- TDR and cable scanning for UTP, STP, Coax, IBM cabling.
- Measures NEXT, length, ATTENUATION, Resistance, continuity, LAN monitor.
- Optional cable management and cable grading software.

### LIGHT SOURCE/OTDR/POWER METER



- Fiberoptic test equipment for LAN, WAN, FDDI.
- PC-based and hand-held.
- Power attenuation, dual wave length test systems, LED or Laser sources, Talk sets.

### DATA PATCH/SWITCH SYSTEMS



- Circuit switching and PATCHING.
- RS232, V.35, X.21, G703 etc.
- Transparent to protocol.
- Full remote or local control.

### INTERVIEW 8000 WAN ANALYSERS



- High performance protocol test system for field and LAB use.
- Supporting C, SS7, Frame Relay, ISDN, X25, SNA, QLLC and user decodes.
- Interfaces for RS232, V.35, X.21, G703, T1.

### NETWORK PROBE



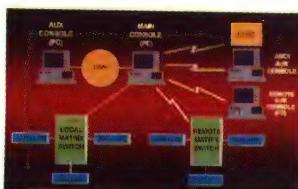
- Multi-function analyser.
- Built-in interfaces for RS232, X.21, V.35, ISDN.
- Multiple protocols support.
- Light weight/low cost.
- AC/DC operated.

### PC-BASED BERT



- Turn your PC into high speed BERT.
- Support RS232, V.35, X21, G703, G704.
- G821 analysis with histogram and capture to disk.
- G704 monitor tool.

### MATRIX SWITCH



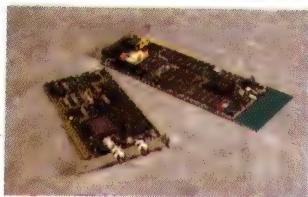
- Non-blocking
- 12 to 4096 ports.
- Mix protocol speeds and interfaces.
- Netview support.

### SIMULATORS



- Most major Telephone network types.
- DDS, ISDN links.
- DDS, ISDN cables.
- Multiple cable gauges, length and speed up to 34.8MBPS.

### PC-BASED PROTOCOL ANALYSER



- Turn PC into full function protocol analyser.
- Half size card supporting major protocols, interfaces.
- Speed up to 256Kbps.

### LAN/WAN ANALYSER



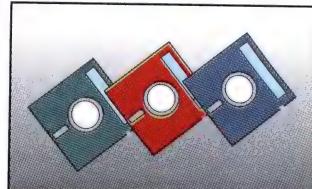
#### LAN: Token Ring ETHERNET

#### WAN: ISDN FASTPAC AUSTPAC TRANSEND DDN SNA

#### PROTOCOLS:

**X.25, SNA, HDLC, SDLC, SS7, Q921/Q931, XNS, TCP/IP, NETBIOS, NETBUI, ISO, APPLETALK, MBI, DECNET, SUNNFS, X-WINDOWS, SNMP.**

### SOFTWARE



- LAN management software for Ethernet, Token Ring, ARCNET and Appletalk.
- Comprehensive statistics and protocol decodes.
- Low, low, cost!

Please send me more information on:

TDR/LAN SCANNER

NETWORK PROBE

FIBEROPTIC TEST EQUIPMENT

INTERVIEW 8000

LAN/WAN ANALYSER

PC-BASED BERT

SIMULATOR

SOFTWARE

MATRIX SWITCH

DATA PATCH/SWITCH SYSTEM

PC-BASED PROTOCOL ANALYSER

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

ORGANISATION: \_\_\_\_\_

PHONE: \_\_\_\_\_



INFORMATION NETWORK SOLUTIONS PTY LTD  
Unit 3a, 3 Lanceley Place Artarmon, NSW, 2064  
PHONE: (02) 906 - 6335 FAX: (02) 906 - 6327



*From the desk of the Executive Director*

# Pay TV — Don't the Users Matter?

**P**ay TV is not an issue with which ATUG expected to become very involved, especially as much of the debate has revolved around media ownership and programming.

ATUG's position has been simply that we should try to catch up with the rest of the world in providing Pay TV services as soon as possible and, however we do that, let not the technology of providing it impede that catch up. In other words, let's get it to consumers quickly by whatever technology providers wish us to use — do not regulate technology.

## We Already Have Pay TV

It's worth pointing out that of course, we already have Pay TV operating in Australia, in two other areas of technology. These are through Sky TV in pubs and clubs and via the VCR market.

In addition, we are advised that Telecom will soon be capable of providing, in addition to telephone service, three simultaneous,

different channels of Pay TV, down the same copper pair to a household. Those three channels can have been selected from a fibre optic termination not far away carrying a selection of 100 channels. Is the government going to ban this technology too?

## But What About the Users?

So when we find that what we thought was a simple and logical condition, that of technology independence, is now disregarded in spite of having been enshrined in the *Broadcasting Services Act*, we have to question whether this *volte face* on Pay TV pays any heed to frustrated user demand for the service.

## MDS an Inferior Technology?

Then we find ourselves questioning the very reason for the *volte face*. Who says MDS is an inferior technology for delivering Pay TV?

The frequencies allocated for provision of 19 channels of MDS range between 2076 and 2400 MHz (with a gap between the A and B bands of 189 MHz). These are, of course, line of sight frequencies which will not give the same blanketing cover of existing free-to-air TV.

But, in much the same way as cellular mobile transceiver sites are set up for full cover of that service, so too can MDS sites be located to provide the necessary coverage. And far from being a technology that limits the scope of nationwide Pay TV coverage, MDS can provide service in areas where the satellite cannot; such as Hobart, Mt Isa, Alice Springs, or Kalgoorlie (Graeme Campbell, MP, please note — I think Warwick Smith, MP, has already noted Hobart!).

ATUG has been advised that, of a possible Pay TV market of 5 million homes, conservatively 20% could be reached within 5 years with MDS and the figure could be as high as 50%-60%.

## Cost to the Consumer

How much is an MDS service likely to cost the consumer? Again we have been advised that the installation cost for MDS to reach a conventional TV set will be a little over \$200. This figure includes the cost of the antenna, frequency down-converter and channel decoder (but not installation, although this could be DIY for many).

The service component of MDS delivery is also believed to be the cheapest of any option currently available.

## Who Loses, Who Gains?

By knocking out MDS technology at this time, it seems that the main losers are the consumers, both in the short and long terms. If another technology comes along later that is better, won't the consumers at least have had their \$200 worth in the meantime?

While Optus remains confident of being able to provide 10 channels of Pay TV, using capacity now available on its B1 satellite, by all means let it do so. But neither should it lose much by providing feeds to MDS retransmission.

The battleground to control provision of Pay TV service is one that should be left to the market to resolve and not the Government to regulate. Let the winners and losers in that field rely on their commercial judgments about which technology they want to pursue.

Wally Rothwell  
Executive Director

**ATUG**

SYDNEY

Level 11, 80 Alfred Street  
Milsons Point, NSW, 2061

Australia

Tel: (02) 957 1333, (008) 22 6281  
Fax: (02) 925 0880

MELBOURNE

Unit 3, 8-12 Sandilands Street  
South Melbourne, VIC, 3205

Australia

Tel: (03) 690 6395  
Fax: (03) 699 9094

# Industry Must Protect Users From Toll Fraud

It was only a few months ago that ATUG warned users to check their telephone bills for hacker tracks because of various complaints from users regarding suspicious call charges.

One ATUG member, a large telecommunications company using a voice-mail in-dial number range, has since had the Australian and Overseas Telecommunications Corporation (AOTC) investigate its telephone bill which had logged unidentified telephone calls to international destinations. The matter is being looked at as a toll fraud case.

Toll fraud is the term commonly used in the United States for unauthorised use of someone else's telephone number to make calls.

Voice-mail cracking is a term used to describe the use of voice-mail dial numbers to make unauthorised calls.

Recently, another ATUG member reported a computer hacking incident but, happily, the police were able to identify and apprehend the culprit.

Yet another member is following an investigation which revealed a number of unexplained calls lasting three or

more hours suggesting illegal access to the computer database.

## A Growing Problem

These cases of electronic fraud are a growing problem for a society living in the information age.

What is disconcerting about these incidents is that unauthorised users are sometimes difficult to trace and apprehend. The task becomes even more difficult as networks are connected globally and an intruder could be located on the other side of the world.

Such is the sophistication of these new electronic thieves that one former Australian Army computer expert has advised companies to use the same security methods which have proved successful to avoid unauthorised access to military systems.

In the United States, the International Communications Association, a federation of more than 700 of the largest telecommunications users in the world, recently conducted a survey to determine the extent of toll fraud amongst its members.

It found more than 550 incidents of toll fraud in the past three years involving thefts totalling more than \$US73.5 million (\$110 million) with each fraud incident costing over \$US130,000 on average. The survey also found that PABX-type fraud was at least a \$US500 million problem for the US economy and that losses in this area were estimated to top \$US2 billion overall.

## Australian Guidelines Required

In Australia, AOTC boasts one of the world's best security networks and when fully digitised it will be even better. This may be why the problem is less well known in Australia, but a recent

investigation into AOTC's call charging and billing by the industry regulator, Austel, may shed more light.

As far as users are concerned, general guidelines addressing toll fraud and its prevention are required for both businesses and consumers. Information of this nature would be welcomed from the carriers and telecommunications product suppliers — especially, if specific guidelines could be developed for individual types of PABX, voice mail and other systems.

These guidelines should disclose all of the available steps that can be taken to configure the specific equipment and systems to avoid such fraud. For its part, ATUG is investigating an insurance scheme, similar to that for computer fraud cover, so that members may cover themselves for the cost of toll fraud.

## Onus on All

In the US, users may take advantage of insurance schemes provided by the carriers themselves. However, this is a facility which is yet to be offered to users in Australia. Nevertheless, it should be noted that the onus is not only on users to protect themselves. It rests also on vendors and carriers to ensure that their products and services are provided with security features to prevent fraud. Obviously such features would enhance the competitiveness of any telecommunications product in the marketplace.

Overall, it should be recognised that there are many conscientious and competent telecommunications users who are more than willing to do everything in their power to detect, control and prevent toll fraud. But it is the industry's obligation to protect users by providing an environment which discourages and penalises such crimes as toll fraud.

**Toula Mantis**



### SYDNEY

Level 11, 80 Alfred Street  
Milsons Point, NSW, 2061  
Australia

Tel: (02) 957 1333, (008) 22 6281  
Fax: (02) 925 0880

### MELBOURNE

Unit 3, 8-12 Sandilands Street  
South Melbourne, VIC, 3205  
Australia

Tel: (03) 690 6395  
Fax: (03) 699 9094



ATUG

## WORKSHOP

## Managing Customer & Supplier Relationships

ATUG is conducting a series of three workshops as a member service to improve the business skills of communications professionals in the new competitive environment. The second in a series of three workshops designed to enhance the business skills of communications professionals in the new competitive environment will be conducted by ATUG throughout March 1993.

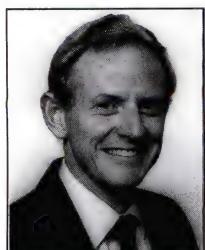
This workshop, designed and presented by Tim O'Sullivan, a director of Focus Communications, aims to:

- Develop the skills to effectively facilitate and manage relationships between internal customers and external suppliers;
- Learn how to work co-operatively with salespeople to achieve win-win outcomes;
- Understand the supplier's perspective of selling;
- Develop a business focus in managing customer accounts; and
- Understand how to develop and maintain effective interpersonal and business relationships.

### 1993 TIMETABLE

|                     |          |
|---------------------|----------|
| Hobart . . . . .    | 2 March  |
| Adelaide . . . . .  | 3 March  |
| Perth . . . . .     | 5 March  |
| Canberra . . . . .  | 9 March  |
| Sydney . . . . .    | 10 March |
| Brisbane . . . . .  | 12 March |
| Melbourne . . . . . | 16 March |

The price of this workshop is \$340 for ATUG members and \$480 for non-members.



"Communications managers and their staff today find themselves managing complex 'buyer/seller' relationships involving their internal customers and external suppliers. In many cases, this proves to be an uncomfortable relationship as each side works towards achieving its business objectives in association with the 'technology manager.' Senior communications managers, thus often face a situation where their technology oriented personnel lack the business skills to effectively manage the customer/supplier relationship in a manner in which both the customer's and supplier's business needs are satisfied."

— *Focus Communications Pty Ltd's Director, Tim O'Sullivan*

For further details contact ATUG on 008 22 6281 or (03) 690 6395  
"Another ATUG member service"

## Exporting to Asia in 1993?

ATUG in conjunction with Sly & Weigall have put together a series of evening seminars discussing the legal and regulatory requirements in the Asian countries of Indonesia, Singapore, China, Thailand, Malaysia and Vietnam. The series began in February and continues over the next six months.

Topics covered include:

- The telecommunications I.T. legal and regulatory environment;
- The investment vehicle;
- Government regulations;
- Government assistance;
- The regulatory body;
- Approved royalties;
- Export of services;
- Local taxation;
- Payment of dividends; and
- Shareholding.

**The cost for ATUG members is \$90 per seminar or \$450 for the whole series.**

**The cost for non-members is \$110 per seminar or \$550 for the whole series.**

### 1993 TIMETABLE

|                          |                        |
|--------------------------|------------------------|
| Vietnam                  | 17 February, Sydney    |
| Indonesia                | 18 February, Melbourne |
| Thailand                 | 15 March, Sydney       |
|                          | 16 March, Melbourne    |
|                          | 21 April, Sydney       |
|                          | 22 April, Melbourne    |
|                          | China 12 May, Sydney*  |
| Malaysia & Singapore     | 16 June, Sydney        |
|                          | 17 June, Melbourne     |
| Combined Asian Countries | 22 July, Perth**       |
| Taiwan                   | 12 August, Sydney      |
|                          | 13 August, Melbourne   |

\* Held at ATUG'93 — Workshop 8 — Free to ATUG'93 delegates.

\*\* This will be an all day seminar — Fees: Member \$340; Non-member \$480.

## ATUG Appoints Queensland Business Manager

Ray Poon, one of ATUG's founding members, has been appointed to the position of Queensland Business Manager on a part-time basis to expand the group's activities in the northern State. Poon has been involved in a number of areas with ATUG. Most recently, he was involved with the organising committee of the successful one-day ATUG Queensland seminar and exhibition. He has also participated in ATUG's management committee and was a Board director until 1989 when he was obliged in accordance with the Memorandum and Articles of Association to resign due to his retirement from the Commonwealth Bank.

Poon has the distinction of being ATUG's longest serving committee and board member, having served eight and a half years. His experience in the telecommunications industry began in 1972 where he worked on the Commonwealth Bank's data communications network. In the early 1980s, Poon had recommended that the bank centralise its telecommunications facility to improve efficiency and to take advantage of the technological and political changes in the telecommunications environment. He retired as the bank's Telecommunications Planning manager where he was responsible for the research, strategy, planning and development of the bank's voice telecommunications facilities.

Ray Poon has been a member of ATUG's Committee in Queensland since 1989.

### ATUG '93

This year, ATUG celebrates its 10th Australian Telecommunications Exhibition and Conference, ATUG '93, with the introduction of two new features 'The Executive Seminar' and 'The Small Business Seminar' (Small Business Seminar details follow on page 5). Both seminars have been designed to cater for the special needs of these two distinct telecommunications users groups.

As always, the annual ATUG convention includes seminars, workshops and exhibitions as well as the 'Communications Update' seminar which precedes the convention's seminars. The update seminar will be held on Monday, 10th May, 1993. The themes to be discussed on this day are:

- The changing environment;
- Regulations and standards; and
- Competition in action.

Other important topics to be covered during ATUG '93 include:

- The telecommunications export market;
- Multimedia;
- Standards;
- New generation public switches;
- Research and development;
- Security; and
- Satellites.

Keynote speakers include Austel Chairman, Robin Davey, AOTC CEO, Frank Blount and Optus CEO, Bob Mansfield. Finally, it is anticipated that the convention will close with a debate titled 'The Battle of the Carriers.' ATUG'93 will be held at Sydney's Darling Harbour from May 10th to May 13th, 1993. Registration forms and the program are available now.

## ATUG '93

The Small Business Seminar

Monday, 10 May 1993

|      |   |  |
|------|---|--|
| 0900 | REGISTRATION  |  |
|      | SESSION 1 SMALL BUSINESS & TELECOMMUNICATIONS   |  |
| 0930 | <b>INTRODUCTION/CHAIRMAN'S ADDRESS</b><br>The Association Perspective — A perception of the role of industry associations in seeking to provide information and assistance on telecommunications matters to their members   | Ken Orth, Executive Director, Restaurant & Catering Association  |
| 1000 | The Government and Small Business   | Minister for Small Business  |
| 1030 | <b>KEYNOTE ADDRESS</b><br>The Commitment to Service - The New Philosophy but the Real Experience  | AOTC   |
| 1100 | MORNING BREAK   |  |
|      | SESSION 2 SMALL COGS MESHING INTO THE BIG WHEEL   |  |
| 1130 | How it all Works  | Johanna Plante, Austel Member  |
| 1200 | How we Want it to Work  | Opposition/Government spokesperson on telecommunications (to be announced)   |
| 1230 | The Consumers' Perspective — Dealing with the Carriers  | To be announced  |
| 1300 | LUNCH BREAK   |  |
|      | SESSION 3 VISIONS FOR THE FUTURE  |  |
| 1400 | The Pitfalls of Technology and Design   | An international expert on product design and the problems faced by small business users   |
| 1430 | Managing Small Business Communications — Management of the systems, products and services currently available and the uses to which they can be put   | To be announced  |
| 1500 | Opportunities from Advancements in Telecommunications Technology — The Social Issues  | Associate Professor Tony Stevenson — The Communications Centre of the Queensland University of Technology  |
| 1530 | AFTERNOON BREAK   |  |
| 1600 | Visions for the Future — The Products and Services we May Expect and How to Use Them  | AOTC   |
| 1630 | Panel or Plenary Session — Theme: 'Where do we go from here? What do you want from us?'   | Panel comprising representatives from AOTC/Optus/The Telecommunications Industry Ombudsman/ATUG/Service Providers and SETEL. Delegates would have an opportunity to ask questions, express opinions and seek clarification on issues raised during the day |
| 1700 | Summary: What can we provide for you? — An assessment of the telecommunications needs of the Small Business sector, both current and future, from the perspective of the various seminar presenters and their suggestions. The final 10 minutes will be devoted to closing comments by the seminar Chairman |  |
| 1730 | CLOSE   |  |
| 1730 | Invitation to join ATUG Communications Update Seminar delegates for drinks  |  |

## March

**8-9** **Mobiles 1993**, Golden Gate Park Plaza Hotel, Sydney. At this 4th annual conference, key decision makers from Asia, New Zealand and Australia will analyse mobile communications planning, regulation and opportunities in the Pan-Asian region. The latest developments in GSM, AMPS, and LEOs will be discussed along with competitive mobile services in Australia and spectrum allocation and management. This conference is designed to study the latest advances, policies, deployment and views. Presentations will be made by key players from DOTAC, France Telecom and other organisations. Fee: \$1,295. Enquiries — IIR Tel: (02) 954 5844 Fax: (02) 959 4684.

**8-10** **Hands-on Internetworking**, IIR Technology Centre, Sydney. This three-day workshop teaches participants to integrate existing LAN resources into WANs, maximise WAN productivity with OSI, assess the latest LAN extension devices to determine which will best suit their LAN needs, and to understand the internetworking standards which affect LAN/WAN capability. The course is also being held in Melbourne, March 22-24. Fee: \$1,695. Enquiries — IIR Tel: (02) 959 5455 Fax: (02) 959 4687.

**9-10** **MM Data Networks Training for Ethernet LANs**, Canberra. Other training courses in Canberra during March are TCP/IP Networking and SNMP Network Management — 11-12; and FDDI — 17-18. The following courses are offered in Sydney during April: FDDI — 15-16; Ethernet LANs — 20-21; and TCP/IP SNMP — 22-23. The following training courses are being held in Melbourne during May: Ethernet LANs — 11-12; TCP/IP SNMP — 13-14; and FDDI — 18-19. All three courses focus on: Concepts, hardware, design rules and applications. Each course contains theoretical sessions, practical exercises, case studies, individual practical exercises, demonstration networks, and management and analysis equipment. Enquiries — MM Data Networks Tel: (02) 980 6922 Fax: (02) 980 6795.

**18-19** **New Technologies & New Standards for IT Security**, The Pavilion Hotel, Canberra. This briefing for government and industry personnel will feature key topics including Open Systems Security, Multi-platform LAN and PC Security, Information Privacy, EFTPOS, Impact of ICAC, and new 1993 World Security Standards. The international guest speaker is Charles Brookson, Head, Group Commercial Security Policy Unit, British Telecom. There will also be practical presentations from organisations including Department of Defence, Federal Justice Office, ATO, Mobil Oil, Caltex Oil, Department of Finance and Department of Social Security. Fee: \$1,195. Enquiries — IIR Tel: (02) 954 5844 Fax: (02) 959 4684.

**24-25** **Cabling Management & Reform**, Sheraton Wentworth, Sydney. Will feature Austel's new standards on Building Cabling Regulations and will look at current technologies and future trends along with the latest international standards requirements for cables and connectors. Four speakers from US companies: Krone, Crescendo, ModTap and Motorola will speak on technology and trends. Four case studies will also be presented. Fee: \$1,195. Enquiries — AIC Tel: (02) 235 1700 Fax: (02) 223 8216.

**24-26** **4th International Congress of EDI Users**, Conrad International Hotel and Jupiters Casino, Gold Coast, Queensland. Presented by the EDI Council of Australia, the central theme for the conference is 'Doing EDI, not talking EDI' and the aim is to address both real and proposed strategies to overcome the current barriers to implementation. Enquiries — EDI Council of Australia. Tel: (03) 819 6860 Fax: (03) 818 3129.

**29-30** **Electronic Messaging — Enhancing Business Communications**, Marriott Hotel, Sydney. This user-focused forum will feature local and international corporate users discussing the benefits of electronic messaging. Issues covered will include directions in global messaging standards, messaging and LAN-based networking, messaging and information security, workgroup computing and remote area messaging, and integrating messaging into your business. Registration Fee: \$1,295. Enquiries — Fiona Kenny, AIC Conferences Tel: (02) 235 1700 Fax: (02) 223 8216.

**29-31** **LAN-WAN '93**, Hotel Nikko, Potts Point, Sydney. International speakers will discuss evaluation and implementation techniques for new technologies and internetworking applications. Areas covered will include bandwidth options and LAN-WAN strategies, bridges and routers for LAN-WAN internetworking, network and internetwork management — evaluating technologies and Strategies, OSI, GOSIP networks and internetworks, and building LAN-WANs for tomorrow. A special practical workshop titled 'Building Frame Relay Networks' will be presented by the Frame Relay Forum. Fee: \$795 for one day workshop; \$1,295 for two-day conference; and \$1,795 for three days. Enquiries IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

## April

**19-21** **Cabling '93**, Regent Hotel, Sydney. This 3rd Annual conference will highlight the role of ISO9000/S3900 in cabling; new GOSIP cabling standards, contracting cabling requirements, the latest Australian and international standards and regulations, and new innovations in cabling technology. Guest international speakers are Linda Gardner, AT&T, Belgium; John

Siemon, The Siemon Company, USA; and Mil Ovan, Motorola, USA. There will be two half-day workshops, the first of which looks at Optical Fibres while the second covers Cabling System Design. Case Study reports will also be offered on Fibre Optics, Contracting, Campus Cabling, and installing an FDDI backbone. The conference will also be held in Melbourne at the Regent Hotel on 21-23 April. Fee: All three days \$1,795; two-day conference and one workshop \$1,595; two-day conference only \$1,295. Enquiries — IIR Technology Tel: (02) 954 5844 Fax: (02) 959 4684.

**19-22** **SuperComm '93**, Georgia World Congress Centre, Atlanta, Georgia, US. Presented by the United States Telephone Association (USTA) and the Telecommunications Industry Association (TIA), SuperComm '93 is the largest annual telecommunications event in the world. This year it has been designated as a Foreign Buyer Show by the US Department of Commerce. The US & Foreign Commercial Service at the American Consulate General in Melbourne plan to lead an Australian Foreign Buyer delegation to SuperComm '93. Enquiries — Lois Logan, American Consulate General, Melbourne. Tel: (03) 526 5927 Fax: (03) 510 4660.

**28-29** **ATM 1993**, Hotel Inter-Continental, Paris, France. The rapid rise of Asynchronous Transfer Mode has left the industry grappling with questions about the shape of tomorrow's networks. A number of such questions dealing with the driving forces behind ATM and the strategies surrounding its acceptance will be addressed by speakers, case study reports and a debate during the two-day event. Included in the agenda are issues such as the cost and benefits of implementing ATM, the realities of ATM in the LAN, the evolution of customer premises network towards ATM, ATM flexibility, and the impact of regulation on ATM services. Enquiries International Conferences Tel: +33 147 23 34 22 Fax: +33 1 49 52 07 56.

**28-30** **Hands-on Ethernet**, IIR Technology Centre, Sydney. Participants will build a live Ethernet network, while at the same time learn key techniques for installing, operating and troubleshooting Ethernet networks. On completion of the course participants will be able to grasp the fundamentals of networks, optimise Ethernet performance and deal with cabling, security and diagnostic tools. Fee: \$1,495. Enquiries — IIR Technology Tel: (02) 959 5455 Fax: (02) 959 4687.

## May

**10-13** **The 4th Joint European Networking Conference (JENC)**, Trondheim, Norway. Organised by RARE (Reseaux Associés pour la Recherche Européenne) in association with other groups including the Internet Architecture Board and the Internet Society, this year's Joint European Networking Conference has the theme 'European Networking in a Global Context.' Enquiries — RARE Tel: +31 20 639 1131 Fax: +31 20 639 3289.

**10-13** **ATUG '93**, Sydney Convention and Exhibition Centre, Sydney. The 10th annual conference and exhibition of the Australian Telecommunications Users Group. Fee: \$850 (Member), \$1,075 (Non-Member). Enquiries — ATUG Tel: (02) 957 1333 Fax: (02) 925 0880.

**17-22** **Asia Telecom '93**, World Trade Centre, Singapore. As part of its four year schedule of events, the International Telecommunication Union (ITU) is presenting Asia Telecom '93 to provide a platform for the exchange of information for technological advancements, and technical, policy, economic and regulatory developments. The Asia region is the world's fastest-growing telecommunications market — there's space for 300 million more lines and for up to \$US1,000 billion in investments in the next 50 years. The four Symposia of the Asia Telecom '93 Forum — Policy, Technical, Regulatory and Economic — are attracting the most influential players in telecommunications. Enquiries — Suzan Hee-Sook Lee, Project Manager, Asia Telecom '93. Tel: +41 22 915 5811 Fax: +41 22 740 1013.

## June

**14-15** **High Speed Networks**, Melbourne (venue to be advised). This two-day seminar will discuss how and why to plan for technologies such as Frame Relay, ATM, B-ISDN and DQDB, which are expected to define the future of networking. Topics include why to invest in technologies, migrating to high-speed WANs, and when and how you will need to act. Fee: \$1,195. Enquiries — IIR, Tel: (02) 959 5455 Fax: (02) 959 4687.

## October

**26-28** **The Inmarsat International Conference and Exhibition on Mobile Satellite Communications**, CNIT, Paris. The first Inmarsat conference and exhibition in 1989 focused on the development of mobile communications. This year the conference will address the future of mobile satellite communications, and will consist of plenary and streamed sessions, where senior level speakers will offer views on a variety of issues surrounding all areas of the industry. The exhibition will show the latest equipment and applications regarding mobile satellite communications. Enquiries — Tania Starley, IBC Technical Services. Tel: +44 71 637 4383 Fax: +44 71 631 3214.

Having Trouble Getting the Message Through???

# TELEPHONE PAGING

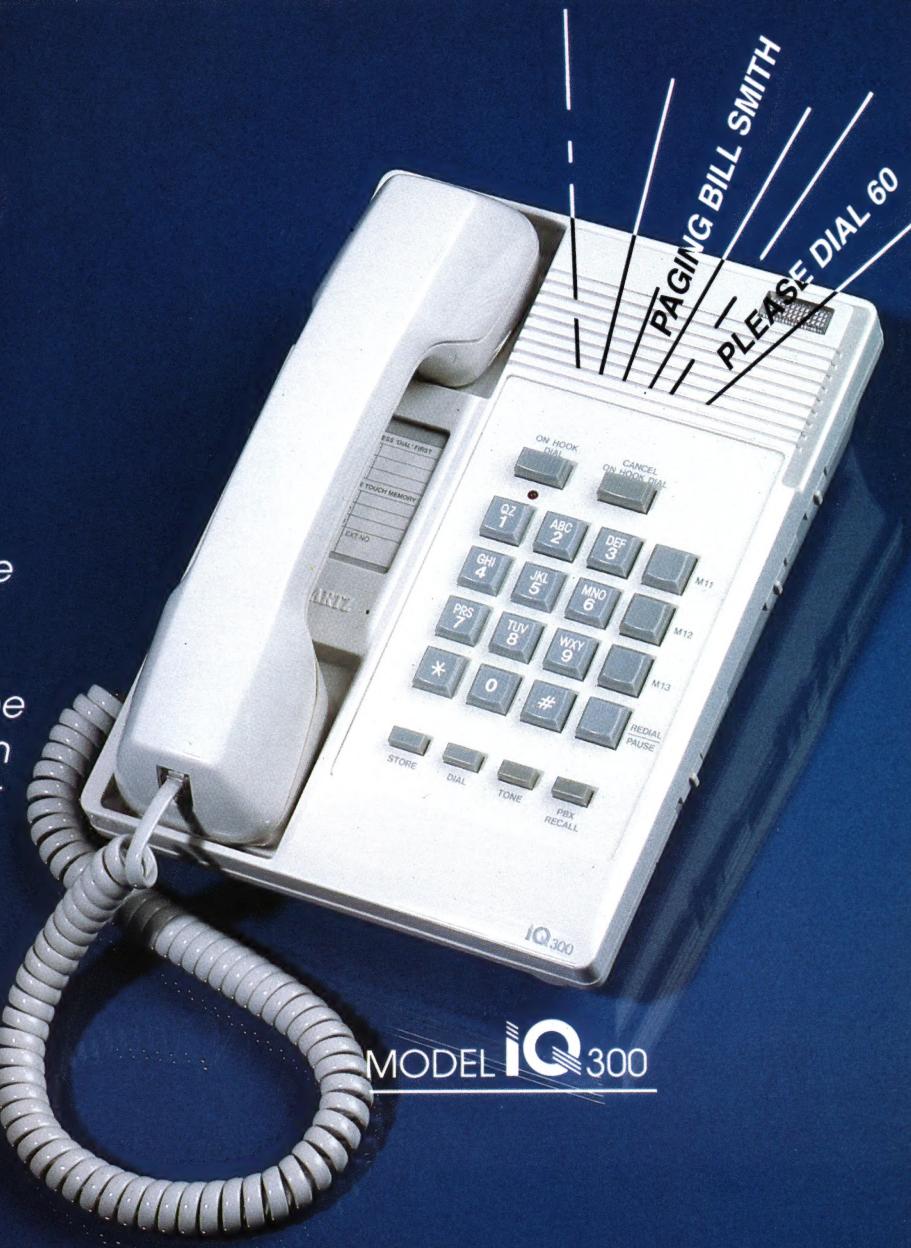
Through Your Interquartz Business Telephone is The Answer

## IQTEL-EPAGE

By INTERQUARTZ®

Discreet Paging through 10 Interquartz phones or 1000 Interquartz phones is no problem for IQTEL-EPAGE

You can page from any phone by simply dialling an access number and make your announcement to every phone user in the building or a certain section only - ie warehouse, or just one phone user.



**IQ INTERQUARTZ®**, The leaders in Business Phones can now offer Your Business a smart and Economical way to add this super efficient Paging System. All you need to have is a PABX and we can do the rest.

## IQ INTERQUARTZ®

THE MANUFACTURERS AND DISTRIBUTORS

**INTERQUARTZ (A'ASIA) PTY. LTD**

MELBOURNE  
42 DOUGHAIRTY ROAD,  
WEST HEIDELBERG, VIC. 3081  
TELEPHONE: (03) 457 5000  
FAX: (03) 458 4049

SYDNEY  
8 PIONEER AVENUE,  
THORNLEIGH, N.S.W. 2120  
TELEPHONE: (02) 875 4011  
FAX: (02) 875 4146

CANBERRA  
TELEPHONE: (06) 243 4860  
FAX: (06) 243 4848

BRISBANE  
4/12 TOLMER PLACE,  
SPRINGWOOD, QLD, 4127  
TELEPHONE: (07) 808 8008  
FAX: (07) 808 8666

TOLL FREE: 008 333 131 AUSTRALIA

Initial Release  
Victoria and New South Wales



YOU'LL BE AMAZED!

## A PABX so advanced it actually talks to you.

These days, most PABX systems have a host of helpful features.

Unfortunately, most people can never remember how to use all of them.

That's why the new Alcatel 4300 has "Voice Prompt". It actually tells you how to use the system. For example, if you dial a busy extension, Voice Prompt will tell you a number to press to ensure a call back, or how to be automatically connected when the line is free. Of course, this is only one of many useful Voice Prompts. And Voice Prompt is only one of many features.

Alcatel Australia. We're Australia's largest communications company, because we know how to compete.

ALCATEL  
AUSTRALIA

For more information, send to Alcatel Australia, P.O. Box 488 North Sydney 2060 or fax to (02) 925 7242

Name

Title

Company

Address

Postcode

Send me product literature  Call me to arrange a demonstration.

LBCM ALC 0087